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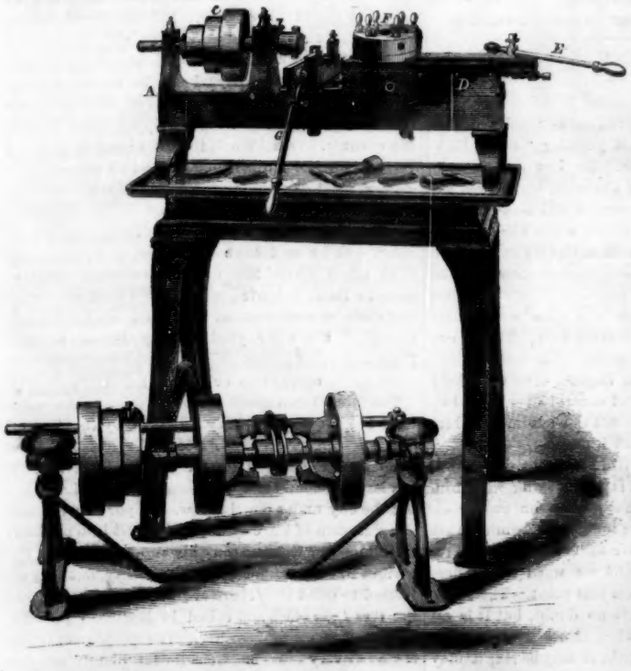
Improved Screw and Tapping Machines.

We wish that every mechanic in the country could see the machines from which the drawings for the accompanying engravings were made. They stand in our office, and in perfect accuracy of workmanship, are not merely a credit to the manufacturers, but are an honor to American mechanics. They are designed for cutting screws by steam or other power, one machine being constructed to cut the external threads on the screw, and the other for cuttting the thread of the receiving or female screw.

SCREW MACHINE.

Want of uniformity in the screws used in connecting parts of machinery is a source of trouble and expense both to the manufacturer and operator, so that in many cases what was at first supposed to be the cheapest article, becomes in the end the most expensive. The difficulty in producing screws perfectly uniform and interchangeable has been principally owing to the imperfect machinery used; imperfect not only in workmanship but in construction, and especially wanting in devices to compensate for the wear which will unavoidably take place in the running parts.



BROWN AND SHARPE'S SCREW MACHINE.

BROWN AND SHARPE'S TAPPING MACHINE.

The annexed cut represents a screw machine which in its general construction is not new, but it has some novelties which will be noticed in the following description. The bed, A, which is of cast iron, is quite heavy, and has at one end two uprights cast solid with it, into which are fitted bronze boxes to support the spindle. The front box, *b*, is made in four parts to close up for wear, the two middle pieces being forced in horizontally toward the center of the spindle by the screws in the side of the upright. The spindle has only one flange or collar, which is outside of the front box. Between this flange and the end of the box is a hardened steel washer. The cone pulley, *c*, is well fitted to the arbor and kept from turning by a spline. Back of the pulley is a nut by which the pulley can be forced forward and its hub kept up to the rear end of the front box. By this means the front journal can be readily kept tight, though considerable wear should take place. The rear box is made in two parts in the usual manner. Should the spindle heat by continued use, it will not bind endwise, nor will its expansion lengthwise affect the accuracy of work done on the machine. The spindle is hollow and is provided with a hollow spring collet, in which shells of different sizes (which are cheaply made) are inserted, for holding the wire. The rear end of this collet is round, and fits the tapering hole in the end of the spindle. The front end is squared, and fits a hole in the chuck or collar, which screws on the end of the spindle. In this chuck are two screws bearing on opposite sides of the square end of the spring collet, by means of which the wire is centered, after which it can be moved, and still kept central, by loosening only one of the screws. At the other end of the bed of the machine, resting upon two V-shaped ways, is a rectangular piece, D, which can be fastened at any point by a bolt from underneath. Upon and attached to this is another piece, which is fitted to slide in a direction parallel to the bed, and is moved by a long hand lever, E. On the end of this sliding piece nearest the spindle a round head, F, is so arranged as to revolve horizontally. In the edge of this head are six or seven holes radiating from the center, which serve to hold the mills, cutter and dies used in making the screws. The head is held very firmly in its place, while the cutters are operating, by a steel pin, which comes up through the piece on which the revolving head rests at the point nearest the line spindle. This pin is hardened and slides through a hardened steel bushing, and the upper end, which is tapered, enters into hardened bushings in the bottom of the head. These steel bushings are ground inside and out after hardening, and the pin is afterward ground into them, so that the point fits them all alike. This pin is withdrawn when the long hand lever is moved back by means of a short lever, of which the fulcrum is attached to the sliding piece, which supports the revolving head, one end being connected with the pin and the other striking an inclined plane in the lower piece, which is fastened to the bed. The extreme back motion of the long hand lever, E, brings a star wheel on the under side of the revolving head in contact with a dog projecting upward from the lower piece, which causes the head to revolve far enough to bring the next tool in a position ready to operate on the wire. When the hand lever is brought forward, the star wheel slips over the dog, the pin enters the hole in the head, being forced up by a spring acting on the rear end of the short lever, after which the cutter commences to operate. There is an arrangement whereby any wear in the center hole of the revolving head can be compensated for. On the other end of the sliding piece, projecting underneath it, is a screw which can be set to limit its motion. The tools in the working

head are each held by two screws, by loosening which they can be moved endwise to make the adjustments required for the different cuts on the work. Between the spindle and revolving head, and attached to the bed, is a slide rest, operated by a hand lever, G. It has two tool posts, one at the back, sliding in a groove parallel with the ways of the machine, and one in front, sliding in either one of two grooves, side by side, but at right angles with each other. The bottom of this rest is planed on the ways of the bed, and can be moved upon them to any position required. Two tools are used in these for cutting off, pointing, or grooving. The motions of both these tools are limited by set nuts upon a screw underneath the rest. The lathe bed has short legs and is set upon an iron table having a channel around the edge to catch the oil. The overhead work has two patent friction pulleys to reverse the motion of the arbor. Several sizes of these machines are made—the largest suitable for screws like the breech pin of the Springfield rifled musket, and the smallest for screws $\frac{1}{16}$ to $\frac{1}{4}$-inch diameter, and for drilling gun cones. On the large machines a hand wheel, with rack and pinion, is used to operate the tool head.

The overhead pulleys, with the hangers in which they run, are represented in a reversed position on the floor beneath the machine.

These machines will be found very useful in any machine shop for making all kinds of set screws and studs at half the usual cost, and of perfectly uniform size. They have been introduced into the U. S. Armory at Springfield, and into many of the private gun manufactories throughout the country.

Gunmakers and others desiring further information can address the manufacturers, J. R. Brown & Sharpe, at Providence, R. I.

TAPPING MACHINE.

All machinists have experienced the tediousness of cutting screw threads in nuts or other parts with a tap worked with an ordinary tap wrench. Various devices have been employed to facilitate this operation, especially when large numbers of holes of small diameter are to be threaded. The tap is sometimes fixed to the spindle of a lathe and motion given to it in either direction by means of a belt pulled by the hand of the workman, or in some cases, where the lathe has a reverse motion, by power. When the piece to be tapped is too large to admit of this method, a tap fixed in a bit stock is tolerably efficient. A machine has occasionally been used in which the tap is severed by means of a treadle. But most of the arrangements in common use are objectionable either on account of being too slow, want of accuracy in the work performed, or the expense occasioned by the frequent breaking of taps.

The machine shown in the annexed cut is intended to obviate these difficulties. In its general appearance it resembles an ordinary lathe, the two pulleys, *a* and *b*, in the head, are, however, independent of each other, one having an axle extending to the right and the other to the left. These axles pass through holes in the ends of the head stock, and are thus supported but left free to revolve. Through the axes of the axles of both pulleys a hole is bored in which an arbor is fitted so as to slide freely, and to one end, *c*, of this arbor a tap is secured. In the middle of the arbor a mortise is made in which is inserted a flat piece of steel about three inches long. This piece stands at right angles with the arbor, projecting an equal distance on both sides, and comes between the two pulleys when the arbor is in place. It acts as a dog by which the arbor is revolved. In the side of each of the two pulleys, between which this dog is placed, are two small studs. These are designed to catch the dog and thereby revolve the arbor, but the distance between the outer ends of these studs in the opposite pulleys is sufficient to leave the dog free from both, so that the arbor may be at rest when both pulleys are revolving. The pulleys are driven in opposite directions, and by pressing the piece to be operated upon against the end of the tap, the arbor is moved endwise, and engaged by means of the dog and clutch screws with one of the revolving pullies. This gives motion to the tap, causing it to enter the hole in the work and cut the thread. A slight movement of the work in the opposite direction, reverses the tap by moving the arbor endwise sufficiently to disengage the dog and connect it with the other pulley. The foot or tail stock, *d*, carries an arbor which slides freely, but is prevented from turning by a spline or feather. On one end of this arbor is a stop which can be adjusted to limit the end motion as desired, and on the other end any device required for sustaining the work can be placed. By setting the stop on this arbor the tap will cease to revolve at any desired point, so that holes with bottoms can be tapped with the same facility as others, care being observed to have the unlocking take place before the end of the tap touches the bottom of the hole. This arrangement entirely prevents the danger of breaking the tap, for, if the motion is not reversed by the operator as soon as the stop strikes, the continued motion of the tap withdraws the dog in the arbor from the clutches in the pulley. The taps are made from straight pieces of round steel wire and are held in the following manner. A straight hole is drilled in the end of the arbor about three inches deep, and of a little larger diameter than the wire from which the taps are made. At the outer end, this hole is tapered for half an inch in depth at an angle of 80°. A piece is then turned to fill this taper and to project slightly beyond the end of the arbor. This piece is bored the size of the tap wire and a slit is cut through one side to the hole in the center. It will be readily understood that if a wire, filling the hole in this tapering piece, is inserted in it, and the piece itself then forced into the tapering hole in the end of the arbor, the wire will be held firmly. This is effected by a screw cap fitting a thread cut on the end of the arbor and having a hole in the center to admit the tap. For tapping the small parts of guns, sewing machines and other light work, this machine is particularly useful, and it has been introduced into several of the principal armories in the country. It is manufactured by J. R. Brown & Sharpe, at Providence, R. I., to whom those interested can apply for further information.

NOTES ON MILITARY AND NAVAL AFFAIRS.

THE SITUATION.

Military matters are progressing as rapidly as possible. General McClellan is pushing "on to Richmond" with rapid strides. At last accounts he was within twenty miles of that city, and it was expected by some that the enemy would make a stand at a point called Bottom Bridge, while others assert that Virginia will be evacuated as rapidly as possible. Gen. McClellan needs the active coöperation of the divisions of Gen. McDowell and Gen. Banks. We are of the opinion that injustice was done when these commands were taken away from him. This is our conviction, but we may be wrong. The responsibility of defeating the enemy in Virginia devolves chiefly upon him, and if for want of control over these two divisions he should be defeated the odium of failure would be unjustly charged to him.

Gen. Halleck is almost within speaking distance of Beauregard at Corinth, and is skirmishing with him daily. A great battle at that point is impending.

Some of our journals are loudly proclaiming that the war is nearly over. We should be happy to re echo this pleasing idea, but we warn our readers against being too sanguine on this point. The rebellion will be crushed we have no doubt, but it is all nonsense to set the time when this will be brought about. It may be one month, it may be six, it may take twelve to crush it, but it must be done.

CAPTURE OF NORFOLK—DESTRUCTION OF THE "MERRIMAC" AND THE NAVY YARD.

One of the most important successes which has attended the operations of the Federal government in its efforts to suppress the rebellion is the surrender of the city of Norfolk and its occupation by our troops. This event took place on Saturday, the 11th inst. The President and Secretary of War had proceeded to Fortress Monroe, with a view, no doubt, to secure a more efficient coöperation of the naval fleet in Hampton Roads with the military operations of Gen. McClellan. After their arrival the iron-clad gunboat *Galena* proceeded up James river, toward Richmond, and the *Monitor*, *Naugatuck* and other vessels went toward Norfolk, with a view to shell out Sewell's Point, and, if possible, draw out the *Merrimac*, to engage her in conflict, but she refused to come out. The batteries on the Point were effectually shelled, and the President in person decided to land forces, for the purpose of moving upon Norfolk, and, after a most careful reconnoissance, selected the spot for the landing. After the forces under Gen. Max Weber had proceeded some distance toward Norfolk he was joined by Gen. Wool, Secretary Chase, and Gens. Mansfield and Viele. Gen. Wool took every precaution to provide for all emergencies that might arise, by ordering up reënforcements. The entrenched camp of the enemy, some three miles in extent, was found deserted, and no serious obstacle presented itself to the advance of our forces. Upon reaching the immediate environs of the city a deputation of citizens was met, bearing a white flag, headed by the Mayor and a portion of the Common Council, who made a formal surrender of the place. Gen. Wool proceeded to the City Hall, where he was well received by the inhabitants, and announced to the people that he had taken military possession of the place and appointed Gen. Viele Military Governor. In his proclamation the Governor stated that "those who had left their homes under the anticipation of any acts of vandalism may be assured that the government allows no man the honor of serving in its armies who forgets the duties of a citizen in discharging that of a soldier, and no individual rights will be interfered with."

The huge iron-clad war steamer—the *Merrimac*—which has created so much stir the world over, and which was the terror of the bulls and bears of Wall street, has finally become extinct. She was blown up on the morning of the 11th, in order to prevent her from falling into our hands. The explosion is described as grand and terrific. It seemed like the shock of an earthquake.

Accompanying the report of the occupation of Norfolk was also the announcement that the Gosport Navy Yard was safe and untouched. We could not credit the report, yet it seemed to be official, and we hoped it might prove true. Information, however, is received, that all the workshops, ship houses, and splendid dry dock were destroyed, together with several vessels in the yard and on the stocks, nothing remained but the charred remains of what was once the most complete and best-equipped navy yard in the country. Gen. Wool, in his dispatch, says "I visited Craney Island, where I found 39 guns of large caliber, most of which were spiked; also a large number of shot and shell, with about 5,000 pounds of powder, all of which, with the buildings, were in good order. As far as I have been able to ascertain, we have taken about 200 cannon, including those at Sewall's Point batteries, with a large number of shot and shell, as well as many other articles of value stationed at the navy yard, Craney Island, Sewall's Point and other places.

OCCUPATION OF NEW ORLEANS.

The latest intelligence from New Orleans announces that the city is now fully occupied by the Federal forces under Major-Gen. Butler. He has taken the famous St. Charles Hotel for his headquarters, and has issued a sound and judicious proclamation, placing the city under martial law. Mayor Monroe and the aldermen of the city have been cast into prison as traitors. The General sent his proclamation to the various newspapers published in the city, but they all refused to print it. Therefore he took possession of the *True Delta* office and called in Northern printers, who worked it off speedily. The people are represented as very sour, but Gen. Butler plainly informs them that, while he will protect them in their rights of person and property, he will at the same time not submit to any thing like treason against the government, either in word or deed. No nonsense of that kind can be tolerated under the ample folds of the star-spangled banner.

INCIDENTS ON THE MISSISSIPPI.

The official reports of Commodore Farragut and Capt. Porter, concerning the engagement which resulted in the capture of New Orleans, proves it to have been one of the most brilliant naval victories on record, perhaps the most so, considering the great preparations which had been made on land and water to resist the advancing fleet. Capt. Bailey, who brought the official report of the surrender of Forts Philip and Jackson, states that just previous to the attack the commanders of the French and English men-of-war, which were lying in the river, asked and readily obtained the consent of Commodore Farragut to visit the forts—their object being to examine the means of defense. The officers reported to the Com-

modore that it would be useless for him, with his wooden ships, to attempt to battle with forts so thoroughly prepared to resist an attack. The gallant Commodore replied that he was sent by his government to make the attack, and *intended to try it on at all hazards*. Our fleet had to contend with regular casemated forts, heavily-armed land batteries, iron-clad gunboats, rams, turtles, chains, floating rafts, fire ships, &c., all of which had to give way in the presence of the skill and bravery of our gallant tars.

ANOTHER NAVAL ENGAGEMENT.

A naval engagement came off on the 10th inst. near Fort Wright, on the Mississippi, between Commodore Foote's fleet of gunboats under command of Capt. Davis, and the Confederate fleet, under Capt. Hollins. The Federal gunboat *Cincinnati* was run into and injured by the *Louisiana*, but will soon be again repaired. The rebel ram *Mallory* attempted to do the same thing for the *St. Louis*, but was destroyed in the attempt. The rebel fleet retired down the river—satisfied for the time being that it would be useless to contend further. The Memphis *Argus*, in an article on gunboats, says:—Thus far, it must be confessed, our attempts with the gunboats on the river have been a disgusting fizzle. The people know it, and so does the government."

THE FLEET OFF MOBILE.

The Petersburg (Va.) *Express*, of the 9th inst., publishes a dispatch from Mobile which states that the advance of the Federal fleet, consisting of seven vessels, are off Fort Morgan and ten more off Horn Island, moving Eastward. This confirms the announcement of Com. Farragut, that he intended to follow up the stampede of the enemy to Mobile. Stirring news may soon be expected from that quarter.

CHAIN-CLAD SLOOPS-OF-WAR AT NEW ORLEANS.

The most conspicuous feature in the outward appearance of the Federal fleet was the iron-linked mail of the sloops-of-war *Richmond*, *Brooklyn* and *Pensacola*, each of which had their engines and boilers protected by chain-cables hung in bites on the outside and triced to eye-bolts and rods running fore and aft. The chains were propped from the hight of the gun-deck to below the water line, and connected together by strong cordage. This was equivalent to four inch plates, provided it withstood the effects of glancing or oblique shots. The only danger apprehended from the chains on the steamers was from raking shot tearing them off, in which case it was feared they would become entangled with the propellers. To guard against this, some of the ships unshackled the chain in short lengths, so that it might reach astern. The machinery of the Iroquois was protected in the same way, the credit of originating which plan is due to Assistant Engineer Hoyt of the *Richmond*, upon which ship it was first adopted, the other vessels following her example.

Among the most efficient of the internal arrangements for the protection of the boilers, the destruction of which by a shot or shell was the most to be dreaded, although this was not the only dangerous part of the ships, was that adopted on board the sloop-of-war *Mississippi*, the machinery of which, being more above the water line, was consequently more exposed to the fire of the enemy. The preparation of this ship for the action involved an immense amount of labor, which engaged her officers and crew for weeks before the attack. Under the direction of Chief-Engineer Lawton, Mr. Bartleman, the First-Assistant, worked night and day with a strong force, and constructed a temporary roof in the coal bunkers just below the water line, about which the heavy chain cables of the ship were packed in layers, running fore and aft. The ends of the shaft of the *Mississippi* were protected by four bales of baggage on the outside of each wheel. The bows of several of the ships, including the *Richmond* and *Hartford*, were protected by sandbags piled up beneath the forecastle, and intended to be removed aft to break the force of raking shot after the ships should have passed the forts. The bulkheads of other gunboats were strengthened in like manner, and also by sand bags, and the coal bunkers of all being kept full, supplied the wants of extra barriers to shot and shell. From the moment the sloop-of-war *Portsmouth* arrived in the river, her officers and crew were engaged in putting the ship in fighting trim. She wore a mail, constructed of her sheet chains, for the protection of her bow against a raking fire, and spread a complete spar netting of strong ropes to prevent her lofty spars—cut away by cannon balls—from falling on deck.

SKILLFUL PREPARATIONS.

The sloop-of-war *Richmond*, taken altogether, was by far the best fitted ship in the squadron. Her hull, standing rigging, and in fact every part of the vessel which could afford the least mark for the rebel artillerists, received a coating of mud paint; she wore splinter nettings, inside of her bulwarks, and spar nettings running fore and aft over her decks. In addition to the iron mail, which she wore externally, her machinery was protected by sand bags, packed against her bulk-heads.

The gunboats *Katahdin*, and the *Harriet Lane* wore their boarding nettings, and other gunboats and ships were provided with the same barriers against the enemy. Many of the ships carried kedge anchors on their yard arms, and grappling hooks on their jib booms, with which to fasten to the gunboats and fire rafts of the enemy.

All of the sloops-of-war carried howitzers in their tops, those on the *Hartford* and *Mississippi* being inclosed with plates of boiler iron for the protection of the men, while the *Hartford*, *Pensacola* and *Brooklyn* wore a screen of cordage around their fore and main tops.

Over nine thousand shells were thrown by the fleet in the bombardment of the forts below New Orleans. Most of them were 13-inch shells which cost with their filling nearly $20 each.

RE-OPENING OF SOUTHERN PORTS.

The President of the United States, by proclamation, announces that on the 1st of June the ports of Beaufort, N. C., Port Royal, S. C., and New Orleans will be re-opened to commercial intercourse, except as to persons and things and information contraband of war.

LAUNCH OF THE NEW IRON-CLAD SHIPS.

The new iron-clad ship-of-war, built by Messrs. Cramp & Son, of Philadelphia, was successfully launched at Kensington, Philadelphia, in the presence of an immense crowd. The christening was performed by the veteran Commodore Stewart, of the old *Ironsides*, at whose suggestion the name of *Ironsides* was given her. She will be a very formidable vessel, and is expected to go into service about the 1st of July.

Cause of the Motion of Camphor on Water.

Mr. Charles Tomlinson recently made a communication to the Royal Society detailing his investigations into the cause of the singular movements of small pieces of camphor when floated upon water. This phenomenon has long been known, but has never before received a satisfactory explanation. Mr. Tomlinson finds that the movements only occur when the camphor is placed upon perfectly clean water, contained in a clean vessel, and that they may be imitated by smearing any small floating objects with a volatile liquid, such as ether, chloroform, &c., and the floating it upon water; when the camphor or other volatile substance, being slightly soluble, spreads in a film over the surface of the water. These films are, however, not given off uniformly, but separate more quickly from the sharp angles and broken surfaces than from the smoother parts of the camphor, &c., and passing off in straight lines re-act upon the frag ments of camphor, causing them to rotate in the opposite direction to that in which the film is passing off. Mr. Tomlinson has devised an ingenious method of rendering these films visible, by fixing the pieces of camphor and then dusting the surface of the water with lycopodium powder, when the currents produced by the passing off of the films are rendered distinctly visible. The irregularity of the movements depends greatly on the influence exerted by the different pieces of camphor on each other, and also on the attraction of the sides of the vessel. It may be noticed that a piece of camphor, when placed in water, wastes much more quickly at the surface of the fluid than above, where it is exposed to the air, or below, where it is acted upon solely by the water; this is owing to the film which is constantly being formed, and which evaporates into the air as rapidly as it is spread out on the surface of the water. Whatever interferes with rapid evaporation tends to arrest the singular phenomenon; therefore the movements are not nearly so lively on a dull, foggy day as on a bright, shining one, when evaporation goes on with great rapidity. Any fixed oil, or the slightest greasiness of the water, or of the containing vessel, will, by producing a fixed film on the surface, prevent the formation of the camphor film, and so interfere with the occurrence of the interesting movements.

UNITED STATES CIRCUIT COURT—OHIO.

Manufacture of Candles—Important Patent Case.

Tilghman vs. Werk.—A very important chemical case was recently decided at Cincinnati. It was heard before Judge McLean and Judge Leavitt, shortly before the death of Judge McLean. It involves a saving, it is said, of nearly one cent a pound in the manufacture of candles. The outline of the case is as follows. Richard A. Tilghman, of Philadelphia, invented a process for decomposing neutral fats into fat acid and glycerine by the simple use of highly heated water under pressure. Prior to his invention the neutral fats were decomposed into fat acid and glycerine by the use of lime and sulphuric acid, or the glycerine was destroyed and the fat acid set free by another process. A patent was granted to Tilghman on October 3, 1854, and a suit was brought against M. Werk, of Cincinnati. The defendant alleged that the plaintiff was not the original and first inventor of the process patented, but that substantially the same process was described in Payen's Chemistry in the year 1851; in Regnault's Chemistry in 1853, and in Roret's Encyclopedia. The defendant also denied that the process or plan employed by him was infringement of the complainant's patent. A large amount of scientific testimony was taken, among others, Professor R. F. Rogers, James C. Booth, Professor Wayne and Grasseli were examined. The case was argued by George Harding and Henry Stanberry for complainant, and by Charles Fox and Nathaniel M'Lean, Jr., for defendants. Judge Leavitt delivered the opinion at the last term of the Court. A motion was afterward made for a rehearing before Judge Swayne and Judge Leavitt, and refused. The points decided were the following:—

1. Plaintiff's invention consists in a process for manufacturine free fat acids and glycerine, by the action of water in a liquid state above the ordinary boiling point of water, and consequently under pressure on fatty bodies or substances.
2. The invention is based on a discovery made by plaintiff that water highly heated and under pressure, of itself, possesses a chemical power of decomposing fat bodies into their elements, fat acid and glycerine.
3. This invention and discovery are not contained in the books relied on by the defendant. Regnault's and Payen's process acts by destroying the glycerine, and does not mention highly-heated water under pressure as the decomposing agent, and is therefore unlike the plaintiff's.
4. Milly & Motard's process, described in Roret's Encyclopedia, although using a close boiler containing fat and water under a high temperature and pressure, yet does not rely on the chemical decomposing power of highly-heated water, but requires the presence of lime to combine with all the fat, and thus prevents the formation of any free fat acid, and is therefore unlike the plaintiff's.
5. Arthur Dunn's process by use of soda is similar to that of Milly & Motard, and unlike the plaintiff's.
6. The plaintiff's invention is a useful and practical one.
7. The description of the process is sufficient in the specification. A fixed rule is there given, which will certainly insure success, and it is also made known that certain variations may be made without changing the process.
8. A principle and a process distinguished. The invention claimed by plaintiff is not merely a principle, but also a process by which that principle may be made practical and operative.
9. The process used by defendant is an infringement of plaintiff's patent:—
   I. Defendant uses and requires water in his process.
   II. That water is highly heated and under pressure.
   III. That water decomposes a certain portion of the fatty body into free fat acid and glycerine, and to this extent infringes.
   IV. The defendant also employs six or seven pounds of lime to one hundred pounds of fat, and thus converts a certain portion of fat into lime soap, and that portion of the operation does not infringe.
10. Where a patent is for a process a defendant cannot avail himself of the process to a partial extent without infringing.
11. The amount which the plaintiff should recover is to be measured by the profit which the defendant has derived from the adoption and use of the plaintiff's invention.

INJURIOUS ACTION OF IODINE ON THE TEETH.—The *Dental Cosmos* says:—M. Stanislas Martin has found, as the result of repeated inhalations of iodine in the treatment of phthisis, that the gums become very sensitive and swollen. The alveolo-dental periosteum next suffers, and the teeth soon lose their solidity. The mouths of some persons, however, seem insensible to the iodine. He has formerly shown that sugar and camphor exert a deleterious action on the teeth themselves, decomposing them and leading to their loss; and he believes that the same is true with regard to iodine, which especially attacks the carious teeth, and those the enamel of which has become damaged by the heat communicated to the mouth by smoking. He has now under examination some teeth completely saturated with iodine.

We are indebted to Hon. Ira Harris, for valuable public documents, also to Hon. Mr. Kellogg and Hon. Mr. Casey, for similar favors.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

At the regular meeting of the Polytechnic Association of the American Institute, on Thursday evening, May 8, 1862, the Chairman, Prof. Joy, announced the subject for the evening to be

THE MANUFACTURE OF SOAP,

and opened the discussion with the following remarks :—

It is not known when the manufacture of soap was first introduced. We find mention of it in our earliest classical writers and in the Old Testament; in Jeremiah, ii. 22, is found the expression, "Though thou wash thee with niter and take thee, much soap;" and in Malachi, iii. 2, "for he is like a refiner's fire and like fuller's soap:" but it is doubtful whether the soap here alluded to was made of the same materials as are at present employed.

The niter mentioned in Scripture was not our saltpeter, but an impure sesqui-carbonate of soda, procured from certain lakes in Egypt. Solomon was acquainted with the action of an acid upon this salt, as he says in Prov. xxv. 20: "As he that taketh away a garment in cold weather and as vinegar upon niter, so is he that singeth songs to a heavy heart." Pliny calls it *nitrum* and relates the circumstances attending the discovery of glass by its accidental fusion with silica on the shore where the sailors were using it to support their kettles while cooking their dinner.

The difference between soda and potassa was not known to the ancients and this was first recognized by Duhamel in 1735. The alchemists were of the opinion that the alkali of plants was produced by the burning, and it was not until 1764 that it was shown to be present in the living plant.

According to Pliny, the Romans learned the art of soap making from the Gauls.

Pliny says: "Soap is an invention of the Gauls and is used for giving a reddish tint to the hair. It is prepared from tallow and ashes, the ashes of beech and elm being preferred; there are two kinds of it, the hard and the liquid, both of them much used by the people of Germany, the men in particular more than the women."

The city of Pompeii contained a complete soap-boiling establishment. It was near the sea shore, conveniently placed for the importation of the blocks of soda (niter) from Syria and next door to the Custom house. The works were uncovered after having been buried more than 1,700 years and found in a tolerable state of preservation.

The first room contained lime soap. In the second were five oval vessels made of cement and coated with hard stucco, which had been used in the manufacture of soap. It is a curious fact that the pumice stones which were rained down upon Pompeii and drove out the soap boiler of that day, are now ground up and used by our manufacturers in the preparation of sand soaps. Whatever may have been the origin of this manufacture, it is clear that it was carried on in a thoroughly empirical manner for many centuries. We are indebted to a man still living for our knowledge of the scientific principles which lie at the foundation of this important industry. The French chemist Chevreul first announced to the Academy of Sciences in Paris, in a paper dated July 5, 1813, his discovery of the compound nature of the fatty bodies. Previous to that time, fat had been regarded as an unmixed organic substance—Chevreul showed it to be composed of several salts, which he called stearine, margarine and oleine. These bodies will be described by the gentleman who is to follow me.

The influence of Chevreul's discovery upon the manufacture of soap and candles was immense, and so great has the industry become that all parts of the world have been laid under contribution for the supply of the raw material. There is an oft quoted sentence in Liebig's Letters on Chemistry :—"*Die Seife ist ein Masstab fuer den Wohlstand und die Cultur der Staaten.*" (Soap is a measure of the prosperity and civilization of a people.)

Liebig refers to the endless threads of manufacture which are bound up with this industry.

The extensive supply of soda ash, has suggested its use in the manufacture of glass and in the preparation of soap. Sulphuric acid was necessary in its manufacture and the supply of this acid became so great that its application increased in proportion. To make sulphuric we need nitric, and for nitric we send to explore and civilize South America, and obtain nitrate of soda, and thus diminish the demand for salpeter and render that available for gunpowder. Hydrochloric acid is an incidental product in the manufacture of soda ash, and this acid being remarkably cheap is extensively used in the preparation of bleaching powders, and in many manufactories; and thus one discovery ramifies in every direction and tends to the civilization of people in remote countries. In this respect, the manufacture of soap is a measure of the prosperity of a people.

I shall leave the practical operations of soap making to gentlemen who are familiar with the subject.

It is known that when a great number of bodies are buried in trenches under certain conditions, a peculiar change takes place. The oleine and glycerine are often removed, and pure acids (stearic and palmitic with ammonia) remain behind. The body retains its natural shape.

During the removal of the bodies of the victims of the cholera buried in Potters-field on Forty-ninth street, numerous examples of this decomposition were observed, and a body is now preserved in the Museum of the College of Physicians and Surgeons on Twenty-third street. This fat is called adipocere, from *adeps*, fat and *cera*, wax. It has been thoroughly investigated by Dr. Wetherill, of Philadelphia. The specimens on the table are from the Potters-field, and the soap and candles were prepared from the adipocere in the course of some scientific experiments.

The Chairman concluded by giving a detailed account of soda ash, illustrated by diagrams and by specimens taken from each step in the process.

He then called upon a German chemist, Mr. Engelhard, of St. Xavier College, to take up another branch of the subject.

Mr. ENGELHARD—Mr. President, The fats and fixed oils, used in the manufacture of soap, of different qualities and properties, are taken both from the animal and vegetable kingdoms. Chemically pure fats have neither taste, smell nor color, and leave a grease spot on paper. They are lighter than water, having generally a specific gravity of .91 to .94. All of them are soluble in ether; a few in alcohol, and none in water. Heated by themselves they will resist a temperature of 500° Fah., but above that decompose; hence their name, fixed oils, in contradistinction to volatile oils, which may be distilled without alteration.

When oils in vats are heated with the hydrated alkalis, such as lime, potash, soda, a process called saponification takes place.

To count up all the different constituents of the known fats and fixed oils would require too much time, and therefore I shall speak of those only which constitute lard, suet, palm oil and olive oil. All fats are mixtures of two, three or four closely-allied substances, namely, stearine, palmatine, margarine—solid at ordinary temperatures—and one liquid, olein. The more olein a fat contains in proportion to the other constituents, the less solid is it. [The speaker then described in detail the four substances named. They are all composed of carbon, hydrogen and oxigen, in the following proportions :—

Stearine....C_{114} H_{110} O_{12}
Palmatine..C_{102} H_{98} O_{12}
Margarine..C_{108} H_{104} O_{12}
Oleine.....C_{114} H_{104} O_{12}]

If a fat or fixed oil is heated with a caustic hydrated alkali the following decomposition takes place:—

Stearine +6HO=glycerine+3 stearic acid and 3 water.

Stearine C_{114} H_{110} O_{12} + 6 Water H_6 O_6 = 3 Stearic acid { C_{36} H_{35} O_3 ; C_{36} H_{35} O_3 ; C_{36} H_{35} O_3 } + 1 Glycerine.. C_6 H_8 O_6 + 3 Water..... H_3 O_3 = C_{114} H_{116} O_{18}

Stearine, palmatine, margarine and olein consists, therefore, of stearic, palmitic, margaric and oleic acids, with the base glycerine. In soap making the following decomposition takes place :—

C^9_{14} H_{110} O^{12} +6(HO)+3(KO)=3(KO)+3(C_{36} H_{35} O_3) +C_6 H_8 O_6+3 (HO)

The stearate of glycerine is decomposed and the stearate of potash is formed. We substitute for the base, glycerine, in the original combination, a new, stronger base, potash, and form the new salt known as soap.

[The speaker next described the several acids mentioned, and pointed out the proper methods of detecting the various adulterations used in the manufacture of soap.]

The PRESIDENT—There is a gentleman present who will give us some information in relation to vegetable soaps.

Mr. AUSTIN—In some countries the natives use the seeds of some plants as substitutes for soap, of some plants the bark is used, and of others the root. Such plants are found to abound in an acrid, narcotic principle—a vegetable alkali, called saponin; but whether their virtues as purifiers of linen depend upon chemical or mechanical action is a question I believe not yet settled. These plants are confined to a very few widely-diverse natural orders of the vegetable kingdom, and frequently to a very few genera of those orders. However, it is, no doubt, contained in many plants where it is not at present suspected to exist. I will mention briefly a few of the more important plants containing saponaceous secretions. The seeds of many plants of the soap-berry family, as the horse chestnut, contain this matter to a great extent. The fruits of these latter lather freely in water, and "a few of them will cleanse more linen than sixty times their weight of soap." Pounded and thrown into water they stupefy fish.

There are two or three genera belonging to the natural order—Rosaceæ and the tribe Guillaiæ—remarkable for their saponaceous secretions. Guillaia saponaria yields one of the barks called Guillaia, used as a substitute for soap. "Two ounces of this bark are sufficient to wash a dress," and it is said to give a remarkable luster to wool. It contains a substance which occasions violent sneezing, and which is allied to saponin.

The California soap plant belongs to the natural order—Liliaceæ, and to the Scillæ or onion tribe. It is used by the natives as a substitute for soap. This plant produces a thick bulb, which is inclosed in a remarkably large and thick bundle of black, coarse fibers—the remains of the nerves of former leaves.

All plants secreting saponaceous matter (and I have mentioned only some of the more important ones) contain also an acrid, narcotic, and often highly poisonous principle, and, no doubt, the two principles are identical—saponin or an allied vegetable alkali. These plants also furnish many useful medicines, and not unfrequently highly nutritious food. The poisonous principle is readily expelled by heat, as in the manihot or jatropha, whence the cassova and tapioca are derived.

Dr. STEVENS—This is the bread fruit of Brazil, and I have seen the natives preparing it for use. The plant resembles very closely our sassafras; it has the same rough bark and the same palmate leaf. The food is derived from the root, and it probably produces a larger amount of food from a given area of ground than any other plant. A yield of 3,000, 4,000, and 5,000 bushels to the acre is not uncommon, and the cultivation is of the roughest kind. In fact, it has no cultivation except planting. The universal South American knife, the machete is used to cut a hole in the sod, the plant is inserted, and left to take its chance. It is sure to take its chance, however. It will root out all other plants, and it cannot itself be destroyed. The root is grated in mills, the milk flows away, and the pulp is dried for food. The milk is wasted by the hogshead; I have seen a river white with it for a long distance below the grating mill. This milk is poisonous, and it contains the saponaceous principle. The women use it freely for washing their persons, and I am bound to say, that during the bread fruit harvest is the only time of year that they are clean.

Prof. SEELY—I will say a word in regard to soft soap. Genuine soft soap, such as I knew in my boyhood, is not now to be found. This was made by the farmers from the ashes of their wood fires. The ashes were placed in a barrel, and leached by pouring water upon them from time to time, and then the lye was boiled with grease to make soft soap. Now farmers come into the city and buy something under the name of soft soap; but it is nothing but a little hard soap with a great deal of water and a little sal-soda. It would be much more economical to buy the hard soap without the water.

Correspondence

Dr. Yeakel's Mode of Making Cannon.

MESSRS. EDITORS :—The United States was pleased to grant me Letters Patent for a new and improved mode of making cannon and other ordnance, bearing date February 1, 1862; but as the papers therewith were placed in the confidential department of the Patent Office, it was not reported in your published list of patents of that date; therefore you could not have had information thereof until your agency was sought to patent the mode in England on the 31st day of March. As this mode of constructing ordnance is destined, in my belief, to recommend itself as superior to all other ways of making cannon now in use, I hope you will grant me the use of your valuable paper for the purpose of presenting a few reflections on the subject of ordnance.

CANNON NOT SO GOOD NOW AS THEY WERE FIFTY YEARS AGO.

It is generally conceded, I believe, that since the coal measures of the earth have been opened and coal so generally used in the smelting of iron ores, the cannon and other ordnance so made are neither so good or strong as formerly, when wood only was employed; this is because all coal contains to a greater or less degree, a sulphur pyrite, generally in the form of the bisulphite of iron, which, as an atomic part of the metal is greatly destructive of its tenuity and strength. Besides, all cannon and other ordnance of whatever or by whatever principle they are cast, are only in a crystallized form.

A GUN SHOULD BE HOMOGENEOUS IN MATERIAL.

Thus, by Capt. Dahlgren's principle, the outer shell of the casting from the trunnions to the end of the breech is made very hard, by a cooling process which vitrifies the metal, so called, of the exterior of the gun, for a couple of inches in depth. By this alteration of the crystallizing process it is intended to diminish the expansion of internal metal opposed to the expansive forces of the burning powder. But I am told that the process of cooling defeats its object by vitiating and weakening the internal crystallization, causing the metal to slough away rapidly at the vent hole.

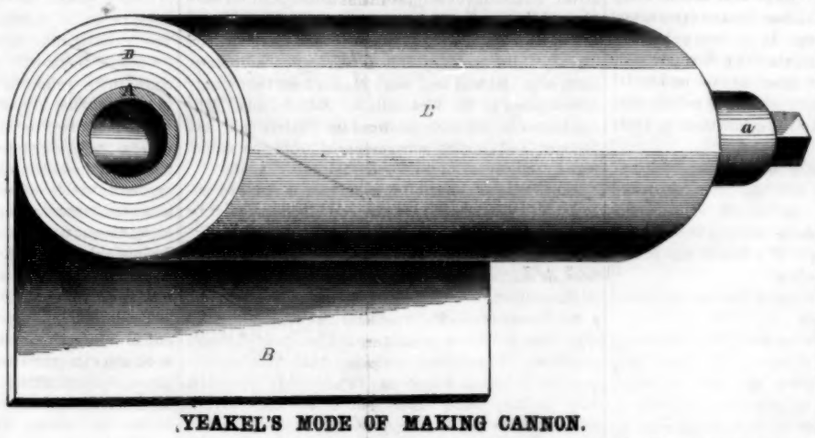
WHAT THE FRENCH AND ENGLISH GOVERNMENTS HAVE DONE.

The French and particularly the English governments have expended a great deal of money in efforts to improve their cannon since the commencement of the Crimean war; and they have attained a considerable improvement, especially of their heavy ordnance; nearly all these latter inventions and improvements have had for their object the substitution of wrought iron and steel for cast iron. Thus one inventor uses a central tube wrapped with wire and soldered, then incasing the mass within an outer metallic covering or jacket. Another builds a series of rings around a central caliber core, then another series are shrunk on the top of the first, and all are welded together. Still another, Mr. Greener, carefully forges and planes a sufficient number of parallel bars, and arranges them around a central mandrel hooped together and then welded. The Armstrong gun, as now made, consists of a given number of bars of iron wound spirally on a central core and then welded by means of a chuck ram to each other and to the breech. The reinforce band on the outside of the Parrott gun is so made while the tube is of cast iron. But it will readily be seen that if a single defective welding should exist, by any one of these several modes, and in practice it has been found almost impossible to prevent their occurrence, the whole forging is lost; I have been informed that only one in three are reliable.

Mr. Horsfall, of England, first made what he denominated wrought-iron guns, by welding together successive piles of heavy bar iron, until he had built up and forged the approximate form and size of gun. This iron mass was then bored and turned in the usual manner. It is in this way that the heavy shafting is made in the United States and elsewhere.

OBJECTIONS TO THE HAMMERED WROUGHT-IRON AND SEMI-STEEL GUNS.

By Mr. Horsfall's plan two insuperable difficulties are encountered, which have not as yet, nor are they likely to be overcome. First, by imperfect welding of the component fragments of iron used, and, second, defective consolidation and lamination of the whole forging; besides the repeated heats to which the substance of the mass is subjected, renders the interior structure granulous, spongy and unconsolidated. In nearly all of these heavy forgings it is only the outside of the mass which is laminated and consolidated from impact of the hammer, the impress of impact or pressure of roller, diminishing toward the center in a direct ratio with the diameter of the mass. These objections apply equally to the forging of semi-steel where the mass made is composed of piles of



YEAKEL'S MODE OF MAKING CANNON.

charcoal iron, called ingots, welded together. Mr. Krupp, of Essen, in Prussia, is the inventor of this mild or semi-steel, and although the explosion of his trial gun, at Woolwich, England, on the sixteenth fire, was not by any means a fair test of his principle, still it may well be doubted whether thick masses of iron or steel can be perfectly consolidated by the impact of hammering or the pressure of rollers. When we were surprised by the present rebellion from the pursuits of a long and prosperous peace, our government had to create field batteries on an immense scale to meet the exigencies of the occasion, and the Secretary of War did certainly the best thing possible in contracting for brass field guns of the old pattern, the Parrott cast-iron gun with wrought-iron reinforce, the Wiard semi-steel, and a wrought-iron gun made by Reeves & Co., of small caliber, in about equal proportions, that we might have in the shortest possible time an abundance of field artillery. The first named is brass, the second and fourth kinds of gun are not homogeneous, and the third-named gun is consolidated imperfectly; it remains to be seen whether the United States, in its ordnance and field artillery, is any better off than England was at the close of the Crimean war.

NEW MODE OF CONSTRUCTING CANNON AND OTHER ORDNANCE.

We come now to consider as briefly as possible the mode by which I propose to construct wrought-iron and steel ordnance of any size, from the 6-lb. field piece to that of 150 lb. caliber. I would first premise, by suggesting the belief that the strongest form which metals can be made to assume, reference being had to great size and surface, is the plate or sheet form, for the obvious reason that to give them this form the metal must be attenuated, and to attenuate is to consolidate, to laminate and to render the plate fibrous. By my mode it is proposed to take, inspected carefully, rolled plates of charcoal iron, of a determinate thickness and of a length, if in one plate, or in one, two or more plates of an aggregate length, equal, when wrapped to produce the intended diameter of the cylinder, and of a width somewhat exceeding the desired length of gun, and to wrap and to weld the same around a central mandrel, solid or hollow, of a little less diameter than the intended bore of the gun; then to bore and finish in the usual manner.

The plan is illustrated in the annexed engraving; A *a* being the mandrel and B B, the sheet wrapped around it. A cylinder thus made it would be impossible to burst, for it is not possible to conceive any other form into which metal could be shaped, which would oppose so great strength and resistance to the expansive forces of gunpowder. At the first glance it would seem to be impossible to construct large cylinders by this mode. But such impression is mainly due to the fact that the eye is not familiar with the kind of machinery required to execute the work. Within the past thirty days I have visited some forty furnaces and forges in Massachusetts, New York and Pennsylvania in the hope of finding a furnace and rolling forge, a trifling or at least not very expensive alteration in which, by the addition of a mandrel, rest and a roller adjusting itself to the ever-increasing mandrel mass, would enable me to construct a mass which would finish up say 500 lbs. weight. But I have not found any, and I must wait until I can command the means to construct the furnace and forging or wrapping mill. One necessary prerequisite is an annealing or heating furnace having great bottom surface to heat the plate, with a wide door, and of width and depth very much greater than generally met with, and so constructed as to heat the plate uniformly; this is required for one of my processes. Next we require a winding or wrapping mill in near relation to the mouth of the furnace, that will wrap up tightly the red-hot plate on its central mandrel. Now a plate of iron thus heated hot and wound up on its mandrel under tension, which tension may best be made by a roller adjusting itself in pressure to the increasing mandrel mass, is ready to go back into the furnace for its welding heat, and the welding and consolidation may be made by impact of hammer or the pressure of rollers. This is one mode of constructing the mass which you see is not impracticable, and a gun constructed in this manner would be the best ever yet made. But there are one or two metallurgical conditions connected with the above process from which it would be well to relieve the forging. Another way of producing the mass is to bend around a central mandrel, a first layer of plate metal, and to weld this first mandrel fold to itself, or itself and mandrel, then continue by means of a wrapping mill to bend several inches of plate at a time, and then to weld it, and so on until the entire mass is wrapped up and welded.

It will be perceived that by this second mode the laminated and fibrous character of the plate is mainly retained, while a doubt may be permitted whether by the first process the mass retains its plate consolidation as perfectly as by the last-described mode. This second mode will require the mandrel to have a rest in the furnace as well as the mill, as the mass requires to be changed frequently by means of a crane or rail slide-way from the furnace to the winding mill and back again. This last mode, it will be seen, unites a number of advantages over the first-described method—first, the forging obtained will certainly preserve to a greater degree its laminated and fibrous character, for only so much of the mass is exposed to the intense heat as is about to be welded. Second, all impurities of the metal, called slag, will constantly be forced out before the welding pressure of the roller or hammer. Third, the mass will not be exposed to the danger inherent to very large forgings, exposed to intense heat in mass to take on a new form of crystallization; and, lastly, a forging of almost any required diameter can be made by this mode by the use of several plates of one thickness or of different thicknesses.

A third way in which this form of wrought cylinder may be made, is to wrap and weld a plate of iron simultaneously around a central hot mandrel in an almost inappreciable space of time; if, as the most experienced forgers in the country assure me, and my own experience approves it, the welding flux lasts three seconds on a quarter inch plate of iron, five seconds on a half-inch plate, and from eight to ten seconds on a seven-eighth-inch plate. Why not? provided the welding cylinders are heated to a maximum consistent with their retention of strength equal to the welding, and the wrapping and welding machinery is in such close relation to the furnace fires as to insure the welding heat to be as perfect on the last inch of plate as on the first.

By this mode it will be seen that the most carefully consolidated plates of iron or steel are rolled or wound and welded together in one continuous length or lengths, thereby producing a quality of uniform welding and consolidation of metal, and a form of barrel composed of concentric welded folds capable of opposing a resistance to the explosive force of powder, which cannot be obtained in any other way.

Lafayette, Ind. D. T. YEAKEL, M. D.

[In accordance with Dr. Yeakel's special request we permit him to state his case in his own way. Our readers will understand that we are not responsible for the opinions of our correspondents.—EDS.]

"Philosophy of Projectiles."

MESSRS. EDITORS:—From your remarks in the SCIENTIFIC AMERICAN of May 3d, under the above caption, I infer that my communication to which you there allude is not sufficiently explicit. You appear to have understood me to argue that shells, from their shape, are the most efficient projectiles against iron-plated vessels. And as bearing against this opinion, you state the fact that cast-iron shells will crush against iron plates. As an instance, you say, "The large shells fired by the *Merrimac* against the *Monitor*, we understand, were all broken in pieces." You also refer to experiments related by Sir Howard Douglas, where solid cast-iron shot were broken to fragments against plates only five-eighths of an inch in thickness.

I was unfortunate in not making myself well understood. I do not hold that a hollow shot is the most effective projectile when guns of small caliber are used, and where a solid shot can be thrown with equal velocity; nor do I claim that cast iron is sufficiently tenacious to give the best results; but I do hold that when it becomes necessary to use guns of 20-inch caliber the shot must be made hollow, or of a material lighter than iron, because of the impossibility of imparting great velocity to such a mass of metal in the shape of a solid shot, and of the almost certain disaster that will follow the attempt. If cast iron is not strong enough for such shot something stronger must be used. I do not, however, think there is any present necessity for the use of such large guns, but fully believe a well-constructed hollow shot, of 250 lbs. weight, may be fired from a 15 inch gun so as to penetrate through the side of any vessel now afloat.

Now a word in relation to the cases you have cited. The shells thrown by the *Merrimac* could not have been over 7½ inches in diameter, as she appears to have had no guns of larger caliber. For that size there appears to be no necessity for using hollow shot; but had they been solid the result must have been the same, as is clearly proved by your example of experiments, as given by Sir Howard Douglas.

In this last example there is one important fact which is not clearly shown in the brief manner in which you relate it. The shot, though "converted into a cloud of langrage too numeous to be counted," in every instance, went through the target, which was a section of the *Simoom*, the plates being supported by strong iron ribs, which, whenever they were struck, were broken in pieces and carried away. And when the experiment was repeated, after filling all solid between the iron ribs with 5½-inch oak timber, and adding 4½-inch oak planking, Sir Howard says: "All parts of the shot passed right through the iron and timbers, and then split and sped abroad with considerable velocity." In fact Douglas condemns iron ships of war for this very reason, and questions their use as transports in case of war, because of the terrible effect of the broken shot after they pass into the vessel. I might follow his statements further, and show, from him, that hollow balls proved as destructive as solid shot, but I will not occupy your space with statements that have been already made public.

And now allow me to correct an error that appears in my communication as published. I am made to say, "It is claimed that a much longer range may be attained with the *large* shot." It should read, "with the *long* shot." I readily admit the claim of long range for large shot. E. S. WICKLIN.

Washington, D. C., May 3, 1862.

[Capt. Benton, of the Ordnance Department, U. S. A., in his work on "Ordnance and Gunnery," agrees with our correspondent in his opinions respecting the effects of large projectiles. He says, "It remains to be determined whether vessels can be conveniently covered with sufficient thickness of iron to resist the crushing effect of enormous projectiles of the 15-inch columbiad; or, in other words, is it practicable to increase the resistance of such iron coverings as to keep pace with the increase in the destructive power of projectiles?" Capt. Rodman claims, with a show of reason, that if the 15-inch gun is not sufficient for this purpose much larger ones can be made that will suffice.

Respecting the resistance of wrought plates to shells, Capt. Benton says, "Thin plates of wrought iron may serve as a protection against shells of any size. The plates may be penetrated, but the shells are broken by the impact, and, therefore, rendered harmless, if the woodwork behind the plates is sufficient to arrest the fragments." He also says, "Cast and wrought-iron projectiles, fired with high velocities against thick wrought-iron plates, are generally broken by impact, while those of puddled steel and homogeneous iron are not much affected by it."

Capt. Benton states that iron-clad ships could be seriously damaged by land batteries. He says, "Though iron-plated vessels have been made which are capable of resisting isolated shots from heavy cannon, none have yet been made fulfilling all the conditions of flotation, stability and manageability, which are capable of resisting a simultaneous and concentrated cannonade of 68-pounder shot, or of rifle projectiles. Such vessels may afford shelter for their crews, for a time, and may pass sea-coast batteries with comparative impunity, but it would not be prudent for them to take up a position near a place guarded by powerful cannon, for the purpose of cannonading it, more especially if the command of the land batteries gives a plunging fire on the vessels."

Capt. Benton's conclusions, he states, were chiefly drawn from experiments made in England, as related in Sir Howard Douglas's "Naval Gunnery."

Naval gunnery, naval architecture and fortification are in a transition state at present. *Monitors* and *Merrimacs*; Dahlgren, Rodman, Parrott and Armstrong guns make men stand wondering respecting what new and more destructive agents may turn up next. —EDS.

Setting Sweet Potato Plants.

MESSRS. EDITORS:—On page 260, present volume, SCIENTIFIC AMERICAN, is an extract from the *Ohio Valley Farmer*, by M. M. Murray, in which he gives very good directions for the selection of grounds, &c., for the cultivation of sweet potatoes. As I am from a potato region, and have had much experience in planting and raising them, I will add another simple plan for setting out the plants, which may be done at any time your plants—called "slips" down in Dixie—are ready. It is better to prepare your ground immediately before the planting, as the freshly-prepared ground is much looser, and is, therefore, more suitable to receive the plants. Having got the ground together with your plants all ready, no matter how dry the weather, commence about the middle of the afternoon, having tubs or barrels of water conveniently situated, and use about a teacup full of water to each plant. The ground being loose, the four fingers of the right hand are passed down about their length into the earth and the dirt pulled up so as to make a hole large enough for a cup of water. With your left hand carefully set your plant down as it should stand. Now let some person pour on the cup of water, which will cause the fibrous roots to swim and straighten out and stand in their natural position. Now quickly let the dirt in your right hand be conducted around your plant in as loose a manner as possible, leaving the top of the plant properly out of the ground. No packing is desirable in this case. By using this method we never have to wait for a suitable season, but get the plants ready as soon as possible. Thus set they commence growing right along, and live and do better than if planted in any other way, unless it is a very favorable season. Much time is saved, and we have a much larger and more abundant crop. If the water is slightly manured it will still be better. A. W. TODD.

Louisville, Ky., April 24, 1862.

Concave Bolt or Projectile.

MESSRS. EDITORS:—Having noticed in your valuable paper a great variety of newly-invented projectiles, I would ask your opinion of one I have experimented with. I use a rifle of medium size. I have cut a clean hole through ½-inch iron plate at 25 yards distance. The shot is made of steel, concave at both ends, being turned from the inner end to within $\frac{3}{16}$ths inch of outer, leaving a shoulder $\frac{1}{16}$th inch; from the shoulder to the inner end is again made to the former size with lead. Could the same be used with effect in larger guns? What is your opinion as to it being a patentable article? May I find an answer to the above in your paper. J. B. W.

Maine, May, 1862.

[The projectile you describe is not new. A gentleman exhibited a similar one in this office sometime ago, and the iron target which was shown with it, indicated about the same result you have obtained. It was well riddled. The shot were fired from a Springfield army rifle. We see no reason why a large projectile might not be used equally as well, and the result be correspondingly great. We do not think you can obtain a patent unless you have your case put into interference with another pending application, and can prove priority of invention.—EDS.

An Improvement in Shell Fuses—Opening for a New Invention.

MESSRS. EDITORS:—Being a regular reader of your valuable paper, I have seen calls for new inventions promptly responded to by improvements in the cases suggested.

As an officer in charge of a division of the mortar service, I have found by experience that an improvement in making fuses would greatly improve our practice. As it is, our fuses seem to be filled by hand, and some being very soft, they do not burn the length of time they are expected to before the explosion of the shell. Some again are very hard, and they burn too long before the explosion takes place. The consequence of this irregularity in filling fuses is that we cannot depend upon our practice.

Now, if some of your readers would make a piece of mechanism by which fuses could be filled under a uniform pressure, they could be tested and marked properly, and then we could burst a shell with that precision necessary to secure perfect success.

By permission of Capt. H. E. Maynadier, commander of the mortar service, I have the privilege of making this suggestion. THOMAS. B. GREGORY.

On board U. S. steamer *Judge Torrence*, near Fort Pillow, May 3, 1862.

New Churning Power Wanted.

MESSRS. EDITORS:—To your list of "inventions wanted," I would suggest the addition of another, namely, some simple power for churning milk, to take the place of dog, sheep and horse powers. The want of such a power has long been felt by butter makers, as little reliance can be placed upon a dog, a goat, or a sheep for churning in a dairy. Such a machine should be cheap, simple in its construction, easily taken care of and economical to use. C. S.

Wallkill, Orange Co., N. Y., May 1, 1862.

AN Alabama paper reports that four caves are now worked for niter in that State. In one place fourteen hands in four months and a half produced 2,755 lbs. In another place 9,000 lbs. were made at a cost of 75 cents per lb., and another 4,350 lbs. at 73 cents.

MISS HARRIET HOSMER'S celebrated statue, *Zenobia*, has been sent to the Great Exhibition in London.

The Ventilaton of Mines.

The following are extracts from a paper on the important subject of ventilating mines, by Mark Fryar, of Glasgow, lately read before the South Wales Institute of Engineers :—

The greatest of all blessings that man can enjoy in this world is that of perfect health ; and whoever may devise means by which the health of a community shall be in any way improved must be looked upon as a benefactor of his race, and an instrument in the hands of the Almighty for the benefit and comfort of his creatures. The animal system of man is a most wonderful and strangely complex piece of mechanism, the order and healthy action of which depend upon the observance of certain laws, which laws are exceedingly simple, and suggested, in most cases, by instinct, the operation of natural desire, or absolute requirement. The violation of any one of these natural laws is sure to be productive of evil. No man has an absolute right to deal with his health according to his own will and pleasure. Our social bonds unite us so closely together that we cannot injure ourselves without injuring others ; and the civil law of the kingdom very justly interferes with all projects and processes in the arts and industrial pursuits which necessarily endanger life, or are productive of ill health and premature death. The extent, however, to which such interference should be carried is a very grave question, affecting, as it does, not only political freedom and the just liberty of individuals, but also the full scope of productive and manufacturing skill and enterprise. Not only is it the duty of every man to be careful of his own health and life, but he must be equally solicitous respecting the health and safety of his fellow man. There are some thousands of workmen employed in mining and other occupations in the world who are daily exposed to dangers—to unhealthy fumes and vapors, deleterious gases, and atmospheres which, from various causes, are charged with insidious diseases, making life but a lingering death, and yet the workmen themselves are comparatively unaware of their own condition in this respect. There are special branches of industry and art in the pursuit of which the individuals occupied therein are exposed to what promotes disease and very materially shortens life, and from which the rest of mankind are exempt ; but many of the evils are irremediable, and there must always be a class of men who are willing to sacrifice part of the years allotted to man that they may pursue a trade or calling of their liking, or society must dispense with some of its present conveniences and luxuries. It is, nevertheless, true that by care and skill the sanitary arrangements, even in places where deleterious operations cannot be avoided, may be considerably improved ; and everything that can be done, by way of mitigating such an evil, surely ought to be done. . . . . The composition of the atmosphere, when in its normal condition of purity, and therefore best adapted for the requirements of life, has been ascertained to be, per 1,000 parts, 788 nitrogen, 197 oxygen, 16 moisture, and 1 carbonic acid gas. A consideration of the process of respiration will enable us more clearly to understand the ill effects of breathing in a vitiated atmosphere. The number of respirations, or alternate breathings, is about twenty per minute under ordinary muscular activity, and the average quantity of air inhaled about 300 cubic inches per minute. It has been discovered that the taller a man is the greater is the vital capacity of his lungs for air. . . . . In coal-mines there is, generally speaking, a much larger amount of deleterious gas produced than in metalliferous mines. Every crevice, opening, or pore met with in rocks during the process of mining is likely to be full of gases of some kind. In coal-mines these gases are chiefly carbonic acid, carbureted hydrogen, and nitrogen, the presence of the latter proving that the coal, while in its natural position of a bed or seam, is undergoing decomposition. Carbonic acid gas is also produced by the breathing of animals, the burning of lamps, and the decaying of timber ; and Dr. Snow has shown that carbonic acid "acts more deleteriously upon the system in proportion as the normal quantity of oxigen has been reduced." The writer then traces the effects of breathing the impure atmosphere of mines, and concludes this part of his subject by saying, "A pretty extensive acquaintance with the most prevailing diseases among miners convinces me of the truth of the following, viz., that there are very few young men above the age of 25 who are quite free from pectoral disease in some shape or other, and above the age of 35 there are not 10 per cent who do not suffer more or less from asthmatic disease. Above the age of 40 almost all miners are the subjects of chronic bronchitis and asthma ; and at this age they generally bear the unmistakable marks of premature old age, and for the most part are unfit for engaging in any severe manual occupation." As a remedy in connection with good ventilation, restriction should be placed upon the hours of labor in the pit, and the adoption of more stringent measures as to the age at which boys are allowed to work underground. The laws of ventilation are very simple, and of easy application. We have seen that a man actually requires about 300 cubic inches of air per minute to maintain vital energy ; but seeing that the due supply of air to the working places in mines depends upon so many contingencies, and that so many causes are in operation by which the air is made impure, it is considered that from 50 to 100 cubic feet of air per minute is the least amount that should be supplied to each man in the underground places of a mine. Badly ventilated mines are most intolerably stupid means of making interest out of invested capital. Mr. Woodhouse, the eminent mining engineer of Overseal, Leicestershire, who has had large experience in the ventilation of coal mines, says "A large saving is invariably realized in practice from the adoption of improved modes of ventilation, because the constant introduction of fresh currents of atmospheric air into the pits tends in a remarkable degree to protect the woodwork of the mine, and to keep the roadways dry and in good order. In pits with a rapid circulation the men respire more freely, the roadways are kept dry and repaired at less expense, and the timber lasts longer by years ; and, therefore, it is a matter of strict economy to ensure a good ventilation." The best ventilated mine is the best paying mine, or, at any rate, its profits are much greater by a good ventilation than it would be by a bad one. It saves the timber and the cost of maintaining the ways ; it enables the men to perform a much greater amount of work in a given time ; preserves the health of the miner, and thereby adds to his comfort and to the number of his days in the world.

Signs of Health.

Perhaps there is no living writer on medical subjects who enjoys a higher reputation for keen observation than Professor T. Laycock, of Edinburgh. The following are some of his opinions delivered in a recent lecture respecting the outward signs of sound health, and indications of long life :—

1. The skin should be healthy ; this is indicated by a freedom from dry scurfiness, both of the skin and scalp ; a certain suppleness, the result of due secretion of sebaceous fluid ; a firmness of texture equally removed from transparent thinness and coarse thickness ; a freedom from chronic congestions, patches of varicose vessels, or any skin diseases, whether parasitic or diathetic. 2. The skin products, whether appendages—as hair, nails and teeth—or secretions, as the pigmentary, sebaceous or perspiratory, should be normal and healthy. The expressions of the eye should be free from peevishness or irritability, for these often mark a tendency to shortness of life ; there should be no *arcus senilis*, or infiltration of the lower eyelid, or marked vascularity of the upper lid. The complexion may be of any temperament, but should be good of the kind ; there should be no signs of unhealthy blood, as a peculiar pallor, or icteric tint, or duskiness of hue. Perhaps the best single criterion of a sound, enduring constitution is to be found in the character of the hair and teeth. Persons tending to longevity have usually sound, well enameled, well set teeth, continuing free from decay until old age, and their hair is thick, not soon gray, nor falling early. In such persons the general powers are vigorous, and it is only some visceral disease or acute fever which shortens life. If to the signs of good health you can add good conduct, and the fact of longevity being hereditary in the family, the individual has a good chance of long life.

The appearance of the patient may be fallacious as to the formation and deposit of fat, whether in the cavities or the adipose tissue. This occurring beyond the healthy mean is not a mark of strength, but of degeneracy. It constitutes the popular sign of advancing age in the "decreasing leg and increasing belly" of Shakspeare ; and an early or excessive fat deposit is not unfrequently indicative of premature old age. Scrofulous children and youth are apt to be very fat before tuberculosis comes on ; very fat men or women rarely reach sixty, and all the fat infantile monsters die early. Polysarcia, as this fatty condition is termed, is to be distinguished from atheroma, which is fatty degeneration, limited to the arterial tissues, and also from fatty deposit in the muscles. It is a general mode of degeneration of nutrition arising from constitutional tendencies, often hereditary, and apt to show itself at epochs of evolution or decline, especially of the sexual glands. Another commonly-received sign of a good constitution is a clear, florid complexion, and it may be received as such, with reservations. But it not unfrequently is the sign of a dangerous tendency to serious diseases of the heart and blood vessels, and to rheumatic affections in persons otherwise of a vigorous habit, and should never be accepted as a good sign without cautious inquiry, more especially into the morbid tendencies as to the nervous system.

Pastils for the Breath and Ulcered Gums.

The following are given by the American *Druggist's Circular* as being more convenient to use for the teeth and gums than liquids :—

First, Take of hypochlorite of lime 7 drachms ; sugar flavored with vanilla, 3 drachms ; gum arabic, 5 drachms. The pastils are made so as to weigh from 10 to 11 grains. Two or three of these pastils are sufficient to remove from the breath the disagreeable odor produced by tobacco smoke. The pastils thus prepared have a gray color and become quite hard ; if pastils of whiter color are required the following substances are employed :—

Second, Take of dry hypochlorite of lime 20 grains ; pulverized sugar, 1 ounce ; gum tragacanth, 16 grains. The hypochlorite of lime is triturated in a glass mortar, and a small quantity of water is poured upon it ; it is then left to repose, decanted and a second quantity of water added ; the two liquids are filtered and the gum and sugar added so as to form a paste. This is divided into pastils weighing from 12 to 16 grains. If it is desired to aromatize the paste, one or two drops of an essential oil may be added ; the oil should be added to the sugar and gum before the paste is formed.

To remove the yellow color from teeth take of dry hypochlorite of lime ½ drachm ; red coral, 2 drachms. Triturate well and mix thoroughly. This powder is employed in the following manner : A new brush is slightly moistened, then dipped in the powder and applied to the teeth.

The following preparation has been employed by Dr. Angelot, of Briançon, in the treatment of ulceration of the gums, a very frequent complaint with soldiers :—Take of hypochlorite of lime from 10 to 25 grains ; mucilage of gum arabic, 1½ to 4 drachms ; sirup of orange peel, 1½ to 2 drachms. Mix thoroughly. This mixture is employed as a lotion to the ulcerated gums.

The *Ohio Valley Farmer* states that a bill is now before the Ohio Senate for making an appropriation of $1,000 to employ a competent person for giving instruction to persons in the manufacture of beet sugar. The *Farmer* suggests that the bill be amended so that the premium of $1,000 be awarded for the best specimen of 5,000 lbs. of merchantable sugar, and 25 lbs. of white sugar, made either from the sorghum or the beet root.

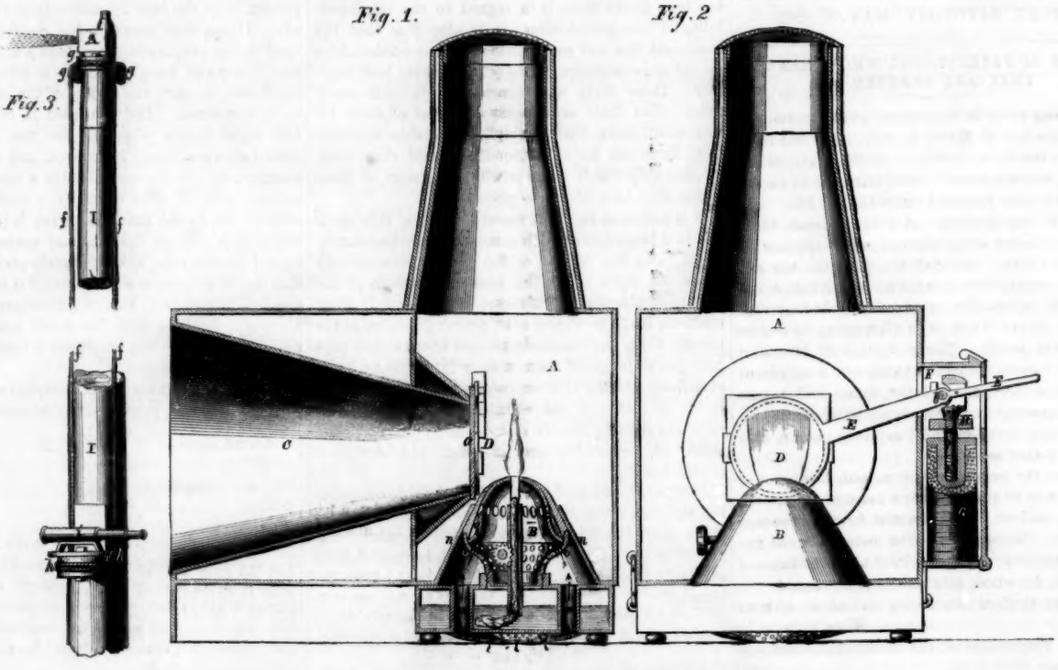
Agassiz says :—Of all air-breathing animals, none exhibits a more surprising power of adapting itself to great and rapid changes of external influences than the Condor. It may be seen feeding on the sea shore under a burning tropical sun, and then, rising from its repast, it floats up among the highest summits of the Andes and is lost to sight beyond them, miles above the line of perpetual snow, where the temperature must be lower than that of the arctics.

The *Atlantic Monthly* for May is received. It sustains its character as the leading literary magazine of the country. It is published by Ticknor & Fields, Boston, at $3 per annum.

Improved Light Telegraph.

The Morse alphabet, in which the several letters are formed by dots and marks of various lengths, may be used in many other ways than that for which it was originally designed—telegraphing by electro magnetism. For instance, two operators, sitting together in church, are able to carry on a silent conversation by pressing their fingers on each other's hands—forming the letters by continuing the pressures the proper lengths of time.

An apparatus has been invented by L. O. Colvin and G. H. Gardner, of Philadelphia, for telegraphing at night by means of a lantern and screen so arranged that the light may be readily displayed and obscured, and thus the letters of the Morse alphabet may be formed by successive flashes of light of the proper lengths. This apparatus is illustrated by the accompanying engravings, of which Figs. 1 and 2 are vertical sections, while Fig. 3 represents the mode of operating a lantern from the masthead of a vessel.



COLVIN AND GARDNER'S LIGHT TELEGRAPH.

A is a close lantern provided with a lamp, B, and having a glass, *a*, in one side opposite the flame. A conical reflector, C, is placed outside of the glass plate to bend all the rays that issue into parallel lines so as to form a cylindrical beam of light. Inside of the glass plate, *a*, is arranged a shutter, D, in such manner that when this shutter is down no light can issue through the glass, but by raising the shutter the light is exposed.

To enable the shutter to be raised and lowered with great ease and rapidity it is operated by electro magnetism. A lever, E, is connected with the shutter, and passing through a slot in the side of the lantern, has its fulcrum at *b*, and carries upon its shorter arm the armature, H, of the electro magnet, G. When the circuit of this magnet is closed, the armature is drawn down and the shutter is raised, exposing the light. In order that the shutter may drop very quickly when the circuit is opened, a spring, *s*, is inserted into the core of the magnet, and a pin, *p*, attached to the armature, compresses this spring when the circuit is closed, but on opening the circuit the reaction of the spring throws up the pin and armature, starting the shutter down, when its descent is completed by its own gravity; the weight of the shutter slightly overbalancing the armature. Thus the successive flashes for transmitting signals are made by opening and closing a magnetic circuit as in the electric telegraph.

Either the calcium or electric light may be employed or the flame of a lamp. The lamp represented in the engravings is recommended by the inventors. The air is admitted through a perforated screen, *l*, under the bottom, and passes through tubes, *m m*, into a cone, *n*, surrounding the upper portion of the lamp. From this cone it is supplied to the lamp through perforated screens, *o* and *q*.

Fig. 3 represents the manner of mounting the apparatus upon the top of a mast either on sea or land, so as to be operated by a person at the foot. A telescope, *i*, at convenient distance above the ground or deck, is connected with the lantern, A, by means of cords, *f f*, and pulleys, *g g*, in such manner that when the telescope is turned the lantern will be turned also, and thus the beam of light may always be kept parallel with the axis of the telescope. Hence the operator has merely to point his telescope to the station to which he wishes to transmit a message, when the light will be visible from the same station.

For secret dispatches the alphabet may of course be altered so as to be intelligible to those only who have the key.

The patent for this invention was granted, through the Scientific American Patent Agency, March 11, 1862, and further information in relation to it may be obtained by addressing Colvin & Gardner, 118 N. Broad street, Philadelphia, Pa.

Important to those who use Steam Boilers in New York.

An act conferring additional powers on the Metropolitan Police, relating to the inspection of steam boilers, was passed last month, and by its provisions all persons owning or using any stationary steam boiler in the Metropolitan Police District, except those connected with ranges in private dwellings, are required to report to the Board of Police, in writing, before the 30th inst., the location of such boiler or boilers so used by them, and the business or purpose for which such boilers are used, and thereafter, in case of any removal of a steam boiler, or the erection of a new one, a like report shall be made forthwith; and all persons are requested to have a nipple and cock, 1¼ inches in diameter, put in some convenient part of their steam boiler, so that the Inspector will have no delay in making inspection for testing.

The "Merrimac" Patented Forty-Eight Years Ago.

In the course of our investigations at the Patent Office we have come across a patent granted to Thomas Gregg, on the 19th of March, 1814—forty-eight years ago—for an invention of a "Ball-proof vessel, to be propelled by steam," which, on examination, proves to be an almost exact model of the *Merrimac*. The sides were to be plated with iron, inclined at an angle of 18° and the drawings show a sharp, iron prow, evidently to be used as a ram. This prototype of the latest triumph in naval architecture, it will be observed, was patented only seven years after the introduction of steam navigation. We shall publish the specification of this invention, with engravings, in the next number of the Scientific American.

The Sole-Cutting Business.

The *Bay State*, Lynn, Mass., says:—Within the past ten or fifteen years there have been great changes in the shoe manufacturing business in this city, and we presume that changes of a similar character have taken place in other towns where the manufacture of ladies' and misses' boots and shoes has been carried on. Within that period the sewing machine and the sole-cutting machine, and different kinds of machinery for heeling have been introduced. And the introduction of machinery has led to the systemizing of the business in such a way as greatly to facilitate production.

The commencement of the sole-cutting business may properly be dated to the time, or about the time, when the sole-cutting machine began to come into use—say about twelve years ago. Manufacturers had found in the course of their business, that to get the sole leather which they wanted, they had to purchase, in buying whole hides, much that they could not use to advantage, and in this way were obliged to charge a higher rate for shoes or suffer loss. And in particular was this the case with small manufacturers. Hence, the idea of a separate branch of business, for purchasing and cutting up the leather into soles, assorting it into different qualities, and quantities as they might want.

We believe Mr. Perry Newhall, who is now in the business, was the first one to carry, to any extent, this idea into effect. He has now been engaged in the business some ten or twelve years, and the amount of his sales has reached, we believe, some years to about $100,000.

The advantages of such an establishment are so apparent that they need not be particularly pointed out. One, however, to manufacturers of small capital, is worthy of special notice. It is this, that it requires less capital to do business by purchasing just what you want and no more than on the old plan, when manufacturers were obliged to buy what they did not want to secure what they did.

L. Perkins, of London, has an engine of 60-horse power, working with a pressure of 500 lbs. on the square inch of piston. The consumption of fuel is only from 1 to 1¼ lbs. of coal per horse power per hour.

Common plumbago, according to recent researches of Dr. Calvert, is composed of 91 per cent of a subcarbide of iron, 8½ per cent of a nitride of silicium, with traces of phosphorus and sulphur.

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EXTENSION OF PATENTS—FOR WHOSE BENEFIT THEY ARE GRANTED.

There seems to be an impression among inventors that, since the law of March 4, 1861, went into force the previous law in respect to extending patents for seven years was abrogated. This is not so in regard to cases which were patented under the old law. Any patent which was granted prior to March 4, 1861, may be extended for seven years on proper application to the Patent Office, provided the patentee has not already been amply remunerated for his invention and proves to the satisfaction of the Commissioner that he has used proper diligence in attempting to realize gains from his patent. The patentees of 1848 and 1849 should lose no time in making out a statement of their profits and losses in consequence of their patents, and in seeing counsel in regard to an extension, if they wish the term of these expiring patents continued for another seven years.

It is often the case that the extended term of a patent produces to the patentee a ten-fold profit over the amount realized during the first fourteen years of its existence. The assignees of a patent cannot obtain this extension; it must be done at the instance of the inventor, for whose sole benefit it is granted.

For full particulars concerning extension, address

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ARE IRON-PLATED SHIPS INVULNERABLE?

The London *Times* has made the remark repeatedly that a struggle was going on in England between the Navy and War Departments; the Admiralty endeavoring to construct vessels which no shot could penetrate, and the ordnance officers of the War Department striving to make guns that would pierce the sides of any ship.

This contest is a sample and a portion of the struggle that is going on in all countries and at all times. In the perpetual efforts which men are making to obtain power over their fellow men ingenuity is constantly exercised to devise means for injuring others and for protecting ourselves. All the complicated engines of war are but equivalents for the shield and spear.

From the beginning of war—since Cain killed his brother—the power of destruction has always had the supremacy over that of defense. It is easy to destroy. Months of labor are required by scores of laborers to erect a building which a child, by dropping a lighted match into a heap of shavings, may sweep away in an hour. Very few are the impregnable fortifications on our globe, and those are inaccessible. As a general rule, however carefully or laboriously a fort may be constructed, its capture, by a competent force, requires but a limited number of days.

This law applies with peculiar force to structures floating upon the vater. Here new means of destruction are brought into action, and the difficulty of preservation is greatly augmented. A hole of moderate size made in the bottom of the structure causes it to sink down in the fluid, and the blowing of the wind very frequently so disturbs the water as to shake the fabric to pieces.

We have recently called attention to the fact that the most powerful artillery in use has never been tried upon iron plates; but if naval constructors should succeed in building ships that would resist the heaviest cannon that can be made they would have triumphed over only one kind of destructive enginery. Their ships would be exposed to the attack of large vessels smashing against them as rams, or they might be pierced by protruding prows; or, more formidable still, they might be blown up by mines of powder under their keels. We know that "torpedos" have never operated very successfully, but this has always been owing to imperfection in the arrangements. It is only necessary to place a hogshead of fulminating mercury and gunpowder against a vessel's bottom, and to explode it there, in order to destroy any structure which man can make to float upon the water.

We have already shown that the fight between the *Merrimac* and *Monitor* did not teach the lesson which has been drawn from it in regard to the impregnability of iron-plated ships; it is also true that the conquests over our sea-coast forts by our wooden ships do not show any superiority of naval over land artillery. Those forts were armed merely with small guns. Had their armaments consisted of even 11-inch columbiads, with supplies of suitable ammunition, there can be no reasonable doubt that every wooden ship which came within fair range of them would have been blown to pieces.

It is a curious fact that we are fighting this great war to a large extent with arms that have become obsolete, and the results of its battles consequently throw no light upon the present relations of the powers of attack and resistance. And even if these relations could be shown with perfect precision at the present time, the knowledge would afford a very poor criterion to judge of them at any future time, however near. In the intense activity which now prevails in the invention of the enginery of war, the conditions are shifting almost daily, and no human foresight can reasonably predict what they will be a month hence.

Judging, however, from the difficulty of constructing and preserving, and the ease of destroying, especially with the forces which modern chemistry has placed in our hands, it is not probable that human skill will ever produce a vessel which will prove invulnerable.

CONVENTION OF SORGHUM SUGAR MANUFACTURERS.

We have received a report of a very large and interesting convention of sugar cane growers and manufacturers, held at Adrian, Michigan, on the 16th and 17th ult. Representatives from Ohio, Michigan, Indiana, Illinois, Missouri and Iowa were present, and many interesting facts were related in connection with the culture of the cane, and the treatment of its juice to obtain sirup and sugar. Many specimens of sirup and samples of sugar were exhibited. There was also an exhibition of seven evaporators, namely, that of H. G. Bulkley, Kalamazoo, Michigan; C. Cory, Lima, Indiana; Eagle Works Manufacturing Company, Chicago, Illinois; O. N. Brainard, Marion County, Iowa; D. D. Tooker, Napoleon, Michigan; John Miller, Rolling Prairie, Indiana; Cook's portable, by J. Richards, Raisen, Michigan. A committee of the convention was appointed to examine these evaporators and decide upon their merits; C. Cory's apparatus, called "Cook's Evaporator with Cory's Improvement," received the preference of the judges. The nature of this invention, as described in a previous volume of the SCIENTIFIC AMERICAN, consists in the arrangements of an elevated partition extended from one side of the pan to the other, in combination with a gate, in such a manner that the circulation of the evaporating fluid can be detained or regulated at pleasure, and that the sirup in its clarified state, and while separated from its scum by continuous active ebullition, can be passed into the finishing part of the pan. We have received two samples of beautiful pale yellow sugar made in this evaporator; they formed parts of parcels for which prizes were awarded.

Mr. Cory, in a communication to the convention, gave some useful information respecting the culture of the sorghum and the treatment of its juice. He stated that light sandy soils produce lighter-colored and better-flavored sweets, but for the sake of larger gains his preference is for richer soils, abounding in good corn-growing qualities. The opinion often published, that Chinese cane is best for sirup and imphee for sugar, is probably correct. Early planting is desirable; the seeds should be first moistened and nearly sprouted; they should be thinly covered, and lightly pressed down, as planted; the ground, if inclined to be wet, should be ridged; the crop is most easily tended when in rows, nearly four feet apart each way; early and frequent cultivation is desirable; a mixture of ashes, lime and gypsum applied to the hills in suitable quantities during the early stages of its growth, is beneficial in many respects, stimulating its growth, and destroying and preventing the existence of multitudes of parasites. When the crop is gathered before proper maturity it should remain a few days, protected from heat and cold, to ripen, before the cane is crushed.

The juice of the samples of sugar exhibited was pressed from the cane by rollers in the ordinary manner. It was then passed to the receiving tub at the head of the evaporating pan, and a small amount of freshly-slacked lime added in a diluted state, to neutralize, in part, the acidity of the juice, and to aid in its defecation. The pan used is of copper, three feet eight inches wide and ten feet long. This is placed on a stationary brick arch, and is divided into apartments. In the first division a most perfect defecation is secured, after which, in a clarified state, and entirely freed from scum, the sirup is passed into the finishing portion of the pan, and subjected to a continued intense heat, till sufficiently cooked at the further end of the pan, at which point it is passed off at the speed of from eight to twelve gallons per hour through the day. Nothing but the small quantity of lime added to the juice was employed in treating the sugar that we have examined.

Samples of sorghum sirup, analyzed at Belcher's refinery in Chicago, presented the following results:—

Cane sugar	45·00
Liquid sugar	28·00
Gluten	3·50
Water	22·00
Other substances	1·50
	100·00

Judging from the interest now taken in the cultivation of sorghum, imphee and beet root by our Western agriculturists, and from the energy and ingenuity displayed to invent improved apparatus for manufacturing sirup and sugar, we conclude that a new and profitable branch of industry is about to be established in our country.

REPORTS OF OUR MILITARY COMMISSION TO EUROPE.

On the 2d day of April, 1855, Jefferson Davis, then Secretary of War of the United States, signed a commission appointing Major R. Delafield, of the Corps of Engineers, Major A. Mordecal, of the Ordnance Department, and Capt. G. B. McClellan, of the Cavalry, of the United States Army, commissioners to visit the theater of the war which was then in progress between England, France, Turkey and Sardinia on the one side, and Russia on the other.

The object of the visit was to "obtain information with regard to the military service in general, and especially the practical working of the changes that have been introduced of late years into the military systems of the principal nations of Europe."

Each of the three members of the commission made an elaborate report of his observations, and a few copies of the reports were printed at the time. Since the breaking out of the war in our country a large demand has arisen for these reports, and when General McClellan was appointed to the chief command of the army, a Philadelphia publisher issued an edition of his report in convenient form for circulation. An extended notice of this book, with illustrated extracts, has appeared in our columns.

On the 2d day of March, 1861, the House of Representatives ordered the printing of 20,000 copies of the reports of Majors Mordecal and Delafield, and to the politeness of the Hon. William Kellogg we are indebted for a copy of each.

These books are far superior in paper and printing to most of the work executed by order of Congress, and the superiority of the illustrations is still more marked. They are principally lithographs by E. B. Jewett & Co., of Buffalo, N. Y., the same parties who have for a few years executed the engravings for the

Patent Office reports, which we have so much admired. We are glad to see this improvement in government printing and engraving, and we hope that it will be carried forward until this class of work is done as well for the nation as it is for private individuals.

THE COLORS FROM COAL TAR.

Number III.

Blue Colors.—We have already described the purple, red and crimson color derived from aniline. On the 30th of July, 1861, G. E. C. Delaire, of Paris, France, obtained an American patent for an aniline blue and violet. The following is an extract from the patent :—

Take ordinary aniline—red—purify and mix it with an equal quantity of pure aniline. This mixture is maintained during several hours at a temperature of 165° Centigrade. It then becomes a violet color, is mixed with water and hydrochloric acid, and is brought to the boiling point. The excess of the red aniline mixture that does not become a violet color is thereby dissolved ; the residue that remains is the violet color sought. If this violet residue be boiled successively with hydrochloric acid diluted with a small quantity of water, and then washed in boiling water, a precipitate will be produced of a blue color with a copper tinge on its surface.

The claim is for the method described of converting the red of aniline into the blue and violet of aniline, by treating the former with pure aniline, in the manner substantially as set forth.

Blue de Paris is produced by heating, for thirty hours, in a sealed tube, at a temperature of 365°, one part of anhydrous bichloride of mercury with two parts of aniline. This color resists the action of weak acids and alkalies, but it assumes a red hue when acted upon by these agents in a concentrated state. It dyes animal fibers with facility. This blue was discovered by M. M. Persoz, De Luynes and Salvetat, of Paris.

White gum lac in powder, boiled with carbonate of soda and an alcoholic solution of red aniline, forms a blue for printing on calicoes.

Green Colors.—Messrs. S. Cliff, C. Lowe and Dr. Calvert, of Manchester, England, obtained a patent June 11, 1860, for producing a green aniline color called emeraldine, on cotton fabrics. The process consists in printing an acid chloride of aniline on cotton cloth which has been prepared with a mordant of chlorate of potash. In a few hours after the aniline is printed on the cloth a beautiful bright green color gradually appears. If this green-colored fabric is then passed through a solution of the bichromate of potash, the color becomes a dark blue, called azurine.

Naphthaline Colors.—That beautiful, colorless solid hydrocarbon naphthaline, has lately been subjected to many experiments, for the purpose of obtaining colors from it, and considerable success has attended these efforts. It unites with nitric acid, forming binitronaphthaline. This is boiled with sulphuric acid, and granulated zinc is added in small portions. The temperature is gradually raised to 392°, and the liquid becomes a deep red color. About eight volumes of water are now added, and the whole allowed to boil for a few moments, then permitted to cool down, when it deposits beautiful red and orange-colored crystals. According to Z. Roussin, a French chemist, it is of nearly of the same nature as alzarine obtained from madder. It colors a red on cotton by using a mordant of alum in preparing the fabric. Purple color can also be obtained from naphthaline by employing oxide of iron for a mordant. Naphthaline colors are but in their infancy, and not yet commercial products, but they may ultimately supersede many other colors.

Leucaniline.—This is a new and perfectly white base, obtained from pure rosaniline, by Dr. Hoffman, of London. Rosaniline is rapidly attacked by hydrogen in a nascent state, or by sulphureted hydrogen, and two equivalents of hydrogen are supplied to it, forming leucaniline. Its composition is C_{20} H_{21} N_3; pure rosaniline, C_{20} H_{19} N_3. Thus, by supplying but two equivalents of hydrogen to the rose-colored substance derived from aniline, a white product is obtained, which is anhydrous, but soluble in alcohol. It is converted into a chloride when boiled with hydrochloric acid. This salt is of dazzling whiteness. It unites in solution with the bichloride of platinum and forms a salt, the crystals of which are of a brilliant orange color. Leucaniline unites with nitric acid, forming the nitrate of leucaniline, which is a white salt, soluble in water. It unites with a large number of agents, such as bisulphate of carbon, chloride of benzole, &c., forming new compounds. There seems to be a chemical relationship between indigo and these aniline colors. There is, for example, white indigo, the composition of which is C_{16} H_{12} N_2 O_2, and blue indigo C_{16} H_{10} N_2 O_2. These two equivalents of hydrogen make the whole difference between white and blue indigo, and two equivalents of hydrogen make the difference between rosaniline and white aniline (leucaniline). By supplying an oxidizing agent to leucaniline it becomes a deep red again. The peroxide of barium, perchloride of iron, and especially the chromate of potash, produce this change. When rosaniline is boiled for a long period with compounds rich in oxigen, it changes into an amorphous powder of a dark brown color. A fulminating compound is produced with the nitrate of leucaniline and the bichloride of platinum.

The Pleasures of Business.

Such complimentary letters as we receive from those for whom we act as attorneys fully compensate us for all the troubles and vexations attendant upon the management of a large business. The following favors of this kind were received by a single mail last week. Read them.—Eds.]

Messrs. Munn & Co. :—Permit me to express my sincere thanks for the very able manner in which you have managed my claims for improvements in Rotary Pumps, bringing them to a successful issue. Very probably I should never have brought my invention before the public had it not been for the advice and encouragement received from you. It is an old adage that "necessity is the mother of invention," and I think there is much truth in the saying. Our national troubles the past year have deprived many mechanics of the greater part of their employment ; necessity compels them to seek other channels for support. The inventive mind strives to bring to light something new that will enable him to establish a business for himself that his future welfare may not be so entirely dependant upon the caprice of others. And if there is one thing to encourage him more than another, it is to know that he can obtain such valuable information and advice as your long experience affords. Your institution is to the inventor what the beacon light is to the mariner—a sure guide to a safe haven. One of the many advantages to be derived from the employment of your Agency is, that it requires no personal attention after the matter is placed in your hands. I am satisfied that you make the interest of the inventor your own. My experience in the rotary pump business for the past ten years convinces me that the one on which, as you inform me, a patent is ordered to issue, will make the best practical working machine in the world and the easiest regulated and kept in order. I shall, at an early day, employ you to obtain a patent for the other devices of mine now in your possession. Before closing this long letter, permit me again to thank you for discharging my business with so much fidelity. With my best wishes for your success, I remain yours, truly, F. B. Pierce.

Brockport, Ill., May 6, 1862.

Messrs. Munn & Co. :—*Sirs*—I suppose you would like to hear how one of your old customers is getting along with an instrument he had patented for cutting the noses of swine to prevent them rooting. To this I can say, first rate. I have sold over two thousand dollars' worth already and I am selling more or less territorial rights every day. It has proved a valuable operation. I am under a thousand obligations to you for favors in connection therewith, and I shall soon apply to you for services in getting out another patent. Respectfully, yours,

Reuben Hurd.

Spring Hill, Ill., May 5, 1862.

Messrs. Munn & Co. :—Through your Agency we have obtained our patent, and for your kindness we return you our most sincere thanks. If I am prospered I shall endeavor to obtain another patent in the course of the year for another and different object altogether, and I shall surely apply to your Agency in preference to any other. I have just received a number of circulars from Washington setting forth what certain parties there will do for me, but I cannot help them nor shall I permit them to help me.

Truly, yours, C. M. French.

Weedsport, N. Y., May 3d, 1862.

Conservatory in the Central Park.

The Central Park Commissioners have contracted with Messrs. Parsons & Co., of Flushing, for the construction of a grand conservatory, the largest in the United States, upon the Park grounds. The building is to be a "Crystal Palace," of iron and glass, 200 feet long, 70 feet wide, and about 50 feet high. Its base will be a parallelogram, and there will be three stories, curving inward like the successive folds of a turban. The conservatory will front Fifth avenue ; its center being opposite Seventy-fourth street ; and directly in its rear will be a beautiful little pond, with walled sides of a symmetrical shape, which will be built during the coming two years. When the Fifth Avenue is graded to its proper hight, it will be on a level with the second story of the proposed conservatory ; and the main entrance to the edifice will therefore be on that story. Stairs and balconies will give access to every portion of the building. The contract provides that the grantees must erect the building entirely at their own expense, after the plans already agreed upon ; that they must place in it nothing but flowers or rare trees or plants ; that they shall be allowed to sell bouquets, &c., to visitors ; that the public shall always be admitted free ; that good order shall always be maintained inside, at the expense of the grantees ; and that the work shall be completed by the first of January, 1864. The specifications of the contract are minute, and are believed to cover the objections which might be made to the granting of a monopoly of such a character. The grantees on their parts, agree to pay a rent which will add considerably to the revenues of the Park. The conservatory will cost about $50,000.

A Yankee Soldier.

The following characteristic sketch is from the *Commercial Advertiser*, Honolulu, Hawaiian Island :—We heard a few days since an anecdote which well illustrates the character of a large class of the American people, and the readiness with which the peaceful citizen becomes changed into the soldier. Most of our townsmen will remember Mr. J. Griswold, who came to Honolulu some two years since, and made one or two voyages to the Phœnix group and other islands, searching for guano. Hearing of the rebellion, he returned immediately to Honolulu from one of his expeditions, having determined to enlist in the army. Procuring a book on army tactics, he went through a series of daily drills under the tutelage of Captain J. H. Brown, the experienced commander of the Honolulu Rifles, until the sailing of the packet for San Francisco. On the passage home, he applied himself to the study of military tactics, and on reaching New York immediately offered his services, was examined and accepted as a captain, and within ninety days after leaving Honolulu, embarked to take an active part in the famous Burnside expedition to North Carolina, which has just gained a victory in the capture of Roanoke Island, and a half dozen towns and villages in the neighborhood, and promises soon to capture Richmond. This instance will show how readily, if necessary, the Americans can and will raise an army of a million soldiers to meet their foes, whether from within or without.

Cost of Raising Sorghum.

S. Ward communicates to the *Prairie Farmer* the following statement of the expense of raising Chinese sugar cane, and manufacturing the sirup, the result of his own experience —

Use of one acre land	$3 00
Plowing	1 00
Dragging and marking out	50
Seed	50
Planting	1 00
Cultivating	1 00
Hoeing	1 00
Stripping	4 00
Cutting and topping	2 00
Drawing to mill	4 00
Two hands and one horse 1 day making sirup	10 00
Fuel	8 00
Use of mill	4 00
Total	$40 00
Cr.	
By 100 gallons of sirup at 40 cents	$64 00
Cost	40 00
Profit per acre	$24 00

Or, 160 gallons sirup at 25 cents per gallon.

If a farmer should get his sirup made on shares the cost, according to the above account, of raising and drawing to a mill (if near by) would be $18.

Receives 80 gallons sirup	$32 00
Cost	18 00
Profit per acre	$14 00

Or, 80 gallons sirup, costing 22½ cents per gallon.

The "London Quarterly" on the "Monitor."

We have received from the publishers, Leonard Scott & Co., the April numbers of the "London Quarterly" and "Westminster Reviews." The "London Quarterly" has an able article on the fight between the *Monitor* and the *Merrimac*, in which the writer takes the same ground that was taken at the time by the Scientific American. The English Parliament and people are rebuked for their foolish excitement on the subject, and the superiority of stationary over floating fortifications is plainly shown. It is stated that the expense of a gun on a steamer is nearly four times greater than that of a gun in a fort. The writer also remarks that iron forts will be little if any more costly than those of granite, from the thinness of iron walls and the absence of internal piers.

RECENT FOREIGN INVENTIONS AND DISCOVERIES.

Manufacture of Alum.—The common mode of making sulphate of alumina (alum) from shale or china clay, is by mixing the aluminous earth with dilute sulphuric acid and applying a gentle heat. The process is tedious. A quicker method of manufacturing alum has been patented by A. A. Croll, of London. It consists in reducing the aluminous shale or china clay to powder, heating it to about 300° Fah., then causing an equal quantity by weight of strong sulphuric acid previously heated to 300° Fah., to flow into the vessel containing the heated shale. The mass is then stirred and allowed to stand until the temperature is reduced to about 150°. The sulphuric acid unites with the alumina in the clay forming alum. The mass is now treated with boiling water which dissolves the sulphate of alumina, and the liquor is then run off into another vessel in which it crystalizes, forming the alum of commerce.

Woolen Substitute for Sponge.—J. Mason, of Nottingham, England., has obtained a patent for making a looped fabric of fleecy wool, to be used as a substitute for sponge. A chain of loops is first knit, corresponding with the size of the sponge required. The ends of the ring of loops thus obtained are then united together, and succeeding rows are formed within the first row, progressively narrowing as the knitting proceeds until the center is gained. This forms the inner surface ot the woolen sponge. Layer upon layer of loops are formed in this manner until the desired size is obtained. To prevent the wool from felting it may be mixed with cotton. Woolen sponges may thus be made of any form or size.

New Chemical for Tanners..—In treating skins to open their pores after they are unhaired, they are placed in a bath of pigeons' and dogs' excrements. It is quite difficult sometimes to obtain these peculiar substances for the purpose stated, therefore substitutes have been frequently sought, but hitherto we believe without success until now. The substitute discovered for it is prepared by soaking fish in water heated to 212° in a close vessel for about three hours, then running off the contents of the vessel into a vat and allowing them to stand for about twenty days; the liquor is next run through a sieve to separate the solid particles, and it is then employed for the purposes stated. A patent has been obtained for this product by James Steart, of London. The product may be of great use to some of our morocco and sheepskin leather dressers.

Preserving Timber.—A patent has been obtained by T. Cobley, of Meerholz, Hesse, for treating wood to render it uninflammable and more enduring, as follows:—A strong solution of potash, baryta, lime, strontia, or any of their salts, are forced into the pores of timber in a close iron vessel by a pump. After this operation the liquid is run off from the timber, and hydro-fluo-silicic acid is forced in, which, uniting with the salts in the timber, forms an insoluble compound, capable of rendering the wood uninflammable.

Fluo Silicate of Tin and Zinc.—Mr. Cobley has also taken out a patent for making pigments for glazing and enameling by dissolving the oxide of tin or zinc in fluo-silicic acid, then acting upon the tin with sulphureted hydrogen, which produces a sulphide that may be applied as a beautiful enamel in the manufacture of porcelain. The fluo-silicate of zinc is formed by dissolving the oxide of zinc in fluo-silicic acid, then drying the precipitate and using it by itself or mixed with baryta, as a pigment or enamel, on porcelain. It is also found to be a good substitute for lead in the manufacture of glass. The patentee states that the glass made with this flux is very pure and free from veins.

Making Tubes of Paper.—A patent has been obtained by W. H. Crispin, of Stratford, Essex, England, for making curved tubes of paper as follows:—The improvement is intended to obviate difficulties which have heretofore attended the manufacture of such tubes In order to form curved paper tubes the paper is, in the first instance, covered with a coating of pitch. This is conveniently done by reducing the pitch to a state of powder, which is sifted or distributed over the surface of the paper, the latter being exposed by means of hot metallic plates or otherwise to the action of a sufficient degree of heat to melt the pitch. The paper thus receives a perfect and even coating of bituminous substance. The paper having been thus prepared, strips thereof are wound spirally around mandrels of the size and form of the tubes which it is desired to manufacture. The mandrels employed are of metal, and may be either solid or hollow. In the latter case heat may be imparted to the interior by means of hot water, steam or hot air. Upon the prepared paper being twisted round the mandrel, as mentioned, the pitch with which the former is coated is partially melted, causing the convolutions of the paper to adhere together, the compression being continued until the tube or pipe is of sufficient thickness, a coating of pitch being given from time to time as may be deemed requisite, while perfect smoothness and regularity of form may be obtained by molding with the hand or by means of suitable tools. The mandrels should be covered with grease or some other substance which will prevent adhesion of the paper, and the curves employed should, in all cases, be portions of true circles in order that the mandrils may be withdrawn without injuring the tubes. If considered requisite, greater strength and hardness may be given to the tubes by employing external pressure during the process of manufacture, and extra layers of paper may be used at those parts which require greater strength, and, in some cases, layers of canvas or calico may be added for the like purpose.

RECENT AMERICAN INVENTIONS.

Oil Press.—This invention consists in the employment of a slide passing over the top of the several press boxes, and through slots formed in the upper portions of the sliding plates, in such a manner that by inserting said slide the several press boxes are perfectly closed on the top and an additional guide for the sliding plates is obtained. It consists further in the employment of a sliding key passing through slots in the lower parts of the sliding plates, in combination with the hinged doors at the bottom of the several press boxes, in such a manner that, by the action of the key, the doors are prevented being forced open when the operation of pressing commences, and they are not liable to become injured by catching against the followers. Invented by W. V. McKenzie, of Jersey City, N. J.

Press for Baling.—This invention, by Isaac S. Schuyler, of New York City, relates to an improvement in that class of presses in which racks and pinions are employed for operating the plunger and follower. The object of the invention is to obtain a press of the class specified, which will admit of having its plunger or follower operated by a direct application of power to the driving shaft by means of cranks so that speed may be obtained when pressure is not required, as, for instance, in moving the plunger or follower to and from its work, and also admit of having the power applied through the medium of levers arranged with clutches in such a manner that the operators may work at opposite sides of the driving shaft and one pass upward while the other passes downward, in order to operate it and thereby obtain a more uniform application of the power when pressure is required, or when the plunger or follower is at work. This invention is assigned in full to J. J. Echel, of New York City.

Ordnance.—This invention, by R. P. Parrott, of Cold Spring, N. Y., is more particularly designed for guns with rifled bore, the object being to obtain great strength and safety with simplicity of manufacture and at moderate cost. It consists in providing a gun having a cast-iron body with a peculiarly-applied reënforce of wrought iron; and it further consists in permanently closing the rear of a so-reënforced gun for muzzle loading, with a solid screw plug of larger diameter than the bore screwed into the rear of the body, the body having had the bore continued through the rear, and having been counterbored and a female screw having been cut in the counterbore for the reception of the said plug. This is the celebrated Parrott gun.

Cut-Off.—This invention relates to that class of cut-offs in which the cut-off valve is fitted to the back of a main slide valve through which the induction and eduction of steam to and from the cylinder of the engine is effected. It consists in the construction of the cut-off valve with its ends oblique to the direction of the movement of the main valve, and in so applying the said valve to the back of the main valve that it may work transversely thereto without interfering with the longitudinal movement of the latter valve, which has the outer orifices of its steam ports arranged obliquely to correspond with the oblique ends of the cut-off valve. This construction of the valve, seat and ports permits the point of cutting off to be varied throughout the whole length of the stroke of the piston by a transverse movement of the cut-off valve, either by hand or by the governor. A. K. Rider, of Hydeville, Vt., inventor.

Hydrometer.—To ascertain the specific gravity of a liquid correctly by the ordinary hydrometer, it is necessary to have the liquid exactly at a certain temperature, as the instrument can only indicate correctly at one temperature. When, therefore, it is desirable to test the density or strength of a hot or warm liquid or solution, as it is very frequently in the process of refining sugar, and in other manufacturing processes, a portion of the liquid or solution has to be cooled, and so much difficulty is experienced in bringing it to the exact temperature to suit the hydrometer, that an absolutely perfect test is seldom obtained. This invention consists in a hydrometer by which the specific gravities of liquids can be ascertained at any temperature, such hydrometer being composed simply of a tube having its lower end closed by a flexible diaphragm. This tube being filled with water to a certain point while placed in a vessel of water, and afterward plunged up to that point in the liquid to be tested, will quickly have the water contained within it brought to the same temperature as the surrounding liquid, and according as the specific gravity of such liquid, which is in contact with one side of the flexible diaphragm, is greater or less than that of the water in the tube, which is on the other side of the said diaphragm, the column of water in the tube will be thereby caused to rise or fall, and the tube being properly graduated, will have the specific gravity of the liquid indicated within it by the hight of the column of water. The invention also consists in the arrangement of the so-constructed hydrometer within an inverted syphon, through which the liquid to be tested may flow constantly, so that the specific gravity of the said liquid can be ascertained at any time without any manipulation whatever, by merely looking at the tube. The patentee of this invention is Peter Hogg, of Brooklyn, N. Y.

Vacuum Tank.—The object of this invention, patented to Joseph P. Walter, of Brooklyn, N. Y., is to save the time required to carry vacuum tanks, such as are used for emptying privies or sinks, back to the yard or station, and also the expensive machinery required for exhausting the air; and the invention consists in the application to each tank of one or more air pumps, which are operated by a working beam receiving its motion from an eccentric attached to one of the wheels of the truck supporting the tank, in such a manner that the air from the tank can be exhausted, while the same is driven through the streets, and that each tank, when emptied, can be driven back directly for a new charge without interruption. It consists also in the arrangement of one or more reservoirs containing suitable acids or chemicals, in combination with said air pump, and with the vacuum tank in such a manner that the nauceous gases exhausted from the tank, after the same has been discharged, are forced through said acid or chemicals, thereby depriving them of the bad smell which otherwise would render it a nuisance to exhaust the tank in the public streets of a city.

CEMENT FOR JOINTS OF PETROLEUM STILLS.—A correspondent states that refiners of petroleum are much troubled to obtain a suitable cement for their stills so as to form a tight and durable joint. The cement used for cast iron, made with iron filings, sal ammoniac and sulphur, has been tried and found wanting; Lead makes a tight joint, but is liable to melt out with the high heat used. Copper also makes a tight joint, but it soon corrodes and becomes useless. Various cements have been tried, but a perfect one has not yet been obtained.

SUBSTITUTE FOR IVORY.—The British *Journal of Dental Science* states that dry collodion, when mixed with gutta percha, or india rubber, forms a compound of great hardness and elasticity. It may be used in the arts as a substitute for horn, ivory, and such-like materials, and billiard balls, buttons, &c., may be made of it.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING MAY 6, 1862.

Reported Officially for the Scientific American

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

35,132.—John Absterdam, of New York City, for Improved Composition for forming Journal Boxes, Bearings, &c.:

I claim a composition of sulphur and black lead, for filling and forming boxes for bearings of journals of shafts and axles, substantially as described.

I claim also the employment of sulphur, in combination with mineral substances, to form a material or composition for bearings of journal boxes for shafts and axles, substantially as described.

35,133.—S. W. Baker, of Providence, R. I., for Printers' Lapping:

I claim a lapping, made in the form of an endless belt or band, and composed of one or more layers or thicknesses of thick woven material, either with or without a surface or coating of india rubber or gutta percha, substantially as described.

Second, The method described, of printing textile fabrics, by the employment of an endless lapping, constructed substantially as described, so as to operate in the manner and for the purposes set forth.

35,134.—Cornelius Bergen, of Covert, N. Y., for Improvement in Grain Separators:

I claim the combination with the raking apparatus described of the longitudinally-slatted bed and the cams, O, for the purpose of producing a vertical vibration at the outer end only, or end farthest from the thrashing cylinder, substantially as and for the purpose set forth.

35,135.—O. M. Buttles, of Milwaukie, Wis., for Improvement in Stoves:

I claim the arrangement of the circular flue, E, at the top of the stove, and in such a position with regard to the exit flue as that a common valve, a, may turn the escaping products of combustion into either flue, substantially as and for the purpose described and represented.

35,136.—J. G. Cain, of Smith's Mills, Pa., for Improved Combination of Table and Sink:

I claim a combined table and sink, composed of a water tank, hinged table top, A, and sliding shelves, E E, the whole constructed in the peculiar manner shown and described.

[The object of this invention is to combine with a dining table, of any size and shape, a sink, in which dishes, &c., may be washed after they have been used on the table, thereby obviating the necessity of moving the dishes about from place to place for the purpose of washing them, and also affording convenience and cleanliness in the operation.]

35,137.—J. H. Calkin, of Troy, Pa., for Improvement in Lubricating Axles of Wheels:

I claim, first, The oil tube, D, formed of two parts, a b, arranged substantially as shown, to admit of being adjusted to suit hubs of different diameters or sizes, as set forth.

Second, In combination with the tube, D, the cap, E, and spring, F, constructed and applied to the tube, substantially as and for the purpose specified.

[The object of this invention is to obtain an oiling or lubricating device which will be capable of being so adjusted that it can be applied to hubs of different sizes or diameters, and operate equally as well as if made for hubs of a specific size, and admit of the axle being lubricated with the hub attached to it, and be also capable of being perfectly protected from dust, so that none can come in contact with the oil and be conveyed by it to the axle.]

35,138.—Mary P. Carpenter, of Buffalo, N. Y., for Improved Ironing and Fluting Machine:

I claim, first, The combination of the fluting tubes, H, connected to the stoppers, g, with a furnace having a double front, for the purposes and substantially as set forth.

Second, Attaching the fluting tubes to the stoppers, g, for the purpose substantially as described.

Third, The front plate, D, in combination with a fluting furnace, for the purpose and substantially as described.

35,139.—Gardner Chilson, of Boston, Mass., for Improvement in Sad-Iron Heaters:

I claim the arrangement of the guard or heat retainer, D, constructed substantially as described, with the pyramidal stand, A, and the shelf or flanch, C, thereof.

I also claim the hollow, pyramidal stand, A, with its sides or plates provided with a series of heating conductors, G G, arranged with respect to them, and so as to extend down through the opening, D, or base of such stand, substantially in the manner and for the purpose as set forth.

I also claim a sad-iron heater, composed of the hollow, pyramidal stand, A, or the same and the guard, D, and the heat conductors, G, and having the plates of the stand constructed substantially as described, and for the purposes as set forth.

35,140.—Edward Court, of Coeymans, N. Y., for Improvement in Brake for Wheel Vehicles:

I claim the slide, F, fitted to the perch or reach, C, and in the back bolster, B, as shown and described, in combination with the shoe levers, G G, draught link, O, lever, K, and rod, L M, the latter having the doubletree, N, attached and placed underneath the draught pole, E, all arranged as and for the purpose set forth.

[This invention relates to an improved brake for wheel vehicles, of that class which are commonly termed self-acting. The object of the invention is to obtain a brake of the class specified, which will operate with certainty, and be capable of being applied to all wheel vehicles, whether constructed with a view to its application or not, be less liable to get out of repair, less cumbersome than usual, and admit of being so attached to the vehicle as not in the least to interfere with the operation of the running gear of the same.

35,141.—E. J. Cridge, of Troy, N. Y., for Improvement in Cooking Stoves:

I claim, first, The arrangement of the apertures or air passages, r o, p and q, in combination with the continuous air space, I J, oven, D, fire chamber, A, draft chamber, C, and fire flues, E E' E'', provided with a valve or damper, W, as specified and shown.

I likewise claim the arrangement of the deflecting plates, d d, in the upright portion of the continuous air space, I J, arranged with the oven, D, fire chamber, A, and fire flues, E E' E'', and having communication with the open air, the oven and the fire chamber above the fire, by the apertures or air passages, r o p and q, respectively, as and for the purpose shown and specified.

35,142.—W. H. Doane, of Chicago, Ill., for Improvement in Stave Machines:

I claim, first, The combination of the india-rubber strip, F, plates, i and j, and screws, k and l, for setting the same, both vertically and horizontally, when the said parts are so arranged in connection with the bed piece, A a, and guides, f, as to afford a rigid bearing for the bolt on both sides of the elastic strip, and the whole employed in connection with the reciprocating knife, D, of a stave-cutting machine, in the manner and for the purposes set forth.

Second, The combination of the india-rubber springs, p, bearings or boxes, n, and screws, s, fitted in the projections, r, of the end pieces, b, of the knife gate, all arranged and operating in connection with the roller, G, and knife, D, of a reciprocating stave cutter, in the manner and for the purposes specified.

[By this invention the knife is made to cut against an elastic cushion, which is adjustable both vertically and horizontally, so that its surface is always kept level with that of the table, and in correct position to receive the edge of the knife, and at the same time a rigid bearing is afforded to the belt on both sides of the cushion. The roller by which the stave is kept from splitting off the block while being cut is made adjustable so as to suit staves of any thickness.]

35,143.—J. N. Dudley, of Mitchell, Iowa, for Improvement in Portable Calenders:

I claim the combination of the several removable rings, b c d e, with the column of figures, B, arranged on a stem, A, substantially as and for the purposes set forth.

[The object of this invention is to produce a simple and cheap calender, which may be readily applied to a pencil-case-match box, to the head of a cane, watch-seal, key, or other similar articles, and made highly ornamental and convenient for finding the days of the month.]

35,144.—O. P. Drake, of Boston, Mass., for Improved Apparatus for Carbureting Air:

I claim the combination as well as the arrangement of a vaporizer, an air-forcing apparatus and an airometer, the whole being constructed to operate together, substantially as described.

I also claim the specified arrangement of the vaporizer and the air-forcing apparatus, whereby the shaft of the rotary frame of the vaporizer may be connected to and put in motion by the shaft of the rotary drum of the air-forcing apparatus.

I also claim the air-inlet box, Q, as made and applied to the case, A, and its shaft, and as provided with a pipe, R, to operate as specified.

I also claim the combination of the auxiliary air pipe, 2 3, with the aerometer and the vaporizing and aerating apparatus, substantially as described.

I also claim the combination of the annular air vessel, g g, with the aerometer, when combined with a vaporizer and an aerating apparatus, as specified.

35,145.—James Eaton, of Boston, Mass., for Improvement in Spindles for Spinning:

I claim, as an improvement in spindles, in so forming the point that the thread will draw from the axes or center of the spindle, substantially as set forth.

35,146.—Jacob Edson, of Boston, Mass., for Improvement in Gas Regulators:

I claim, first, The combination of the floating disk or diaphragm, d, and hollow die cut-off or valve rod, h, with any suitable-shaped receptacle or reservoir of the induction pipe, for the purpose specified, and arranged therein, and operating substantially as described.

Second, Constructing the cut-off in a hollow shape, by means of which it can be readily increased or lessened in weight, at pleasure, for the purposes set forth.

Third, The adjustable rod, m, or its equivalent, for the purpose described.

Fourth, In so constructing the die cut-off, and arranging it in the induction aperture of the apparatus that when pulled or forced up through the same it will scrape or cut off the coal tar, &c., deposited or collected upon their surfaces.

35,147.—E. T. Ford, of Stillwater, N. Y., for Improved Plow Beam:

I claim the peculiar arrangement and construction of a truss plow beam, consisting of the sectional parts, the rear section, g, front section, I, cross bar, X, the side rods, V V, and the double box, c c, as connected to the center bar, e e, the whole combined as described and represented.

35,148.—Thomas Fowlds, of Treverton, Pa., for Improvement in Ordnance:

I claim, first, The combination of the narrow screw thread, s h, of the cap nipple, E, and the wide screw grooves, f, of the screw pin, D, with a cannon, substantially as and for the purposes set forth.

Second, The combination of the sharp point, r, with a hollow screw pin, D D', substantially as and for the purpose set forth.

Third, The combination of the shoulder, i, and passage, d, with a hollow screw pin, D D', substantially as and for the purpose set forth.

35,149.—L. F. and F. W. Letmate, of New York City, for Improved Composition for making Printers' Inking Rollers:

We claim the use or employment of glue, properly combined with glycerine and castor oil, or any of the fixed oils, to form a composition for the manufacture of printers' inking rollers.

35,150.—Kasson Frazer, of Syracuse, N. Y., for Improvement in Buckles, Rings, &c.:

I claim the method described of connecting the ends of wire rod used in forming buckle frame and rings; that is, when the two ends are firmly joined together by interlocking, substantially as stated and for the purpose set forth.

35,151.—William Fulton, of Elizabeth City, N. J., for Improved Coal-Oil Lamp Cone:

I claim, first, The perforated spring plate, D, as shown, or its equivalent, for regulating the elastic force of the air, so that it may be presented evenly to the flame, and as a rest, which accommodates itself to the bottom of the chimney.

Second, I claim the construction of cone, B, as shown, in combination with the perforated shell, K, as shown, and the gauze wire, P, as shown, the whole being arranged substantially as and for the purpose set forth.

35,152.—Peter Hogg, of Brooklyn, N. Y., for Improvement in Hydrometers:

I claim, first, A hydrometer, composed of a tube for containing water or other liquid, fitted with a flexible diaphragm, and operating substantially as specified.

Second, The employment, in combination with the tube, A, and diaphragm, B, of an inverted siphon pipe, E E', the whole constituting a stationary apparatus for testing the density of liquids, and operating essentially as and for the purpose specified.

35,153.—B. B. Hotchkiss, of Sharon, Conn., for Improvement in Explosive Projectiles:

I claim, first, An explosive projectile, in which the contents are solidified, substantially in the manner and so as to secure the advantages set forth.

Second, I also claim the employment in such projectile of an adhesive lining, C, substantially as described, so as to increase the adhesion of the solidified contents to the interior of the shell.

35,154.—T. W. Houchin, of Morrisania, N. Y., for Improvement in Night Lamps:

First, I claim the use or employment of a wick sustainer, constructed as shown in Fig. 3, C, for the purpose specified.

Second, I claim the use or employment of the wick sustainer, as shown in Fig. 3, C, in combination with the stand, A, lamp, C, taper, E, and shade, F, when the same shall be combined and operated for the purpose shown.

Third, Combining a wick sustainer, I, constructed as shown in Fig. 4, with a circular float, J, of cork or other suitable material, for the purpose described.

35,155.—Charles Howlett, of Hartford, Conn., for Improvement in Balances:

I claim the combination of the bearing points, C C, weight, F, and indicator, B, arranged as a self-indicating balance, substantially as described.

35,156.—H. W. Hunter, of New York City, for Improvement in Magnetic Compasses:

I claim a floating compass card, B, formed with its upper surface divided into one-half white and the other black, with the exception of the star-point lines, c' c'', which are black on the white and white on the black section, as described and for the purposes set forth.

35,157.—H. C. Hutchinson, of Cayuga, N. Y., for Improvement in Burners for Lamps:

First, A central draught entering above the lamp, through the later al air tubes, E E, leading to the inner chamber, G, closed at the bottom and surrounded by the wick at the top.

Second, The perforated basin, C C, so constructed as to cause a counterpoise air pressure against the openings of the air tubes, E E, when the lamp is suddenly raised.

Third, A round or oval hollow wick formed around the central tube of the burner from two flat strips hanging loose in the lamp.

Fourth, The screen or perforated guard, K, made in a flat, conical or convex form across the inner chamber.

35,158.—J. H. Irwin, of Beardstown, Ill., for Improvement in Coal Oil Lamps:

I claim, first, Having the draught passage of the lamp divided into compartments by partition plates, b, or b', so arranged as to prevent horizontal or lateral currents of air through the draught passage or burner below the flame, substantially as and for the purpose set forth.

Second, Having the upper end of the wick tube, C, made of rounded or scolloped form, in combination with a cone or deflector, B, having its apex or top around its slot, f, made of corresponding form, as and for the purpose set forth.

[This invention relates to an improvement in that class of lamps which are designed for burning coal oils and other similar hydrocarbons, which volatilize at a rather low temperature, and require an excess of oxygen to support proper combustion for illuminating purposes. Mr. Irwin's present address is box 334, Chicago, Ill.

35,159.—John Iseman, of Rosston, Pa., for Improvement in Joiners' Squares:

I claim the combination of the square, A, and straight edge, B, arranged and connected together as and for the purpose set forth.

[This invention consists in inserting in a straight wooden stock or straight edge a joiner's or carpenter's square in such a manner that the length of rafters for a roof may, by a very simple adjustment of the parts of the implement, be accurately ascertained, the hight of the roof and the length of the span being given; the implement also being capable of being used as a trying square, T-square or miter.]

35,160.—A. H. Leplay and J. F. J. Cuisinier, of Paris, France, for Improvement in Revivifying Animal Charcoal for Refining Sugar:

I claim, first, The method described of revivifying animal black or charcoal by hot water or steam, in combination with milk of lime used in the filtering vessels, substantially in the manner and for the purposes set forth.

Second, The method described of clarifying saccharine liquors, juices and sirups by means of phosphates, substantially as set forth.

Third, The manner of operating and effecting by means of the different processes described, the revivification of animal black or charcoal so as to allow of the collection of the ammonia given off in the revivification.

35,161.—C. C. Lewis, of White Water, Wis., for Improved Soap:

I claim the use of the specified ingredients for the purpose of making soap, substantially in the specified proportions and for the purpose set forth.

35,162.—W. A. Lighthall, of New York City, for Improvement in Refrigerators for Steam Engines:

I claim the combination of the diaphragm plates, F F', with the tubes, C, and division plates, B, arranged and to be operated as and for the purpose set forth.

35,163.—Henry Loewenberg, of Boston, Mass., for Improvement in Mode of Making Button Holes:

I claim the new method, substantially as described, of making either button or eyelet holes, such involving the employment of dies, heat pressure and gutta percha, or its equivalent, substantially in manner as specified.

35,164.—S. M. Logan and P. E. Baker, of New Carlisle, Ohio, for Improvement in Terra Cotta Roofing:

I claim, first, The use of the caps, a a, for covering the joints in the manner set forth and described.

Second, The caps, in combination with the laps, b b, in the manner and for the purpose set forth and described.

35,165.—Gordon McKay, of Boston, Mass., for Improved Process of Sewing the Soles of Boot and Shoes:

I claim the described process, in sewing the soles upon boots or shoes, of changing relatively the positions of the boot or shoe and the horn, substantially as described.

35,166.—A. G. Wilkins, of Cooperstown, Pa., for Improved Washing Machine:

I claim, first, The arrangement of the larger roller, B, smaller end roller, C, central fluted roller, D, and inclined slatted carrier, F, within a wash tub, in the manner and for the purpose, substantially as described.

Second, The arrangement of the platform, E, slatted inclined carrier, F, large roller, B, smaller roller, C, fluted roller, D, longitudinal screw rods, d d, and vertical screw arms, g g, in the manner and for the purpose described.

Third, The arrangement of the clothes-confining cords, a, across the slotted carrier, in an organization such as described, for the purpose set forth.

35,167.—Edmund Maher, of New York City, for Improvement in Repeating Firearms:

I claim, first, The combination of the rib, A, flanched and grooved hub, F G', and recesses or grooves, S, of the chambered bar, C, substantially in the manner and for the purpose described.

Second, Combining with the gun, the ring, I, friction pall, K, with slotted arm, and the parts attached thereto, for giving a slight movement to the gun on its pivot, at every revolution of the transverse shaft, F, as fully set forth.

35,168.—W. V. McKenzie, of Jersey City, N. J., for Improvement in Oil Presses:

I claim, first, The employment of the slide, G, in combination with the press boxes, A' B' C', constructed and operating as and for the purpose shown and described.

Second, The arrangement of the key, H, in combination with the hinged doors, a' b' c', at the bottom of the press boxes, A' B' C', constructed and operating as and for the purpose specified.

35,169.—Matthias Mead (assignor to Samuel Randall), of Lowell, Mass., for Improvement in Drawing Cans for Cotton Rovings:

First, I claim a drawing can constructed substantially as and for the purpose described.

Second, I claim forming the bottom of a drawing can of one piece of raw or green hide, substantially as and for the purpose described.

35,170.—A. A. Peatt, of Greenfield, Mass., for Improvement in Shackle for Connecting Thills to Axles:

I claim the iron, A, provided with the hook, B, in combination with the eye, D, and the bolts, C C, or their equivalents, substantially as and for the purpose set forth.

[The object of this invention is to obtain a shackle or thill coupling which will be simple in construction, form a strong and durable connection and, in case of breakage, posses in itself a means to form a temporary connection to prevent the detachment of the thills from the axle, so as to avoid the application or use of the ordinary "safety straps" now employed to prevent the thills, in case of such a contingency, coming in contact with the heels of the horse and frightening him.]

35,171.—R. P. Parrott, of Cold Spring, N. Y., for Improvement in Hooped Ordnance. Ante-dated Nov 6, 1861:

I claim a gun made as shown and described.

I claim the arrangement of the screw plug, c, constructed as shown with the said gun, as set forth.

35,172.—Samuel Rainbird, of Norwich, England, for Improvement in Grappling and Raising Sunken Vessels, &c.:

I claim, first, The mode or modes of grappling sunken vessels and other submerged bodies, by the peculiar arrangement of chains, as described.

Second, The mode or modes described of raising sunken vessels and other submerged bodies by balancing a portion only of the weight by air vessels and then raising the sunken vessels, or other submerged bodies, by means of windlasses or similar machinery.

Third, The apparatus described, consisting of air cylinders or vessels divided into compartments traversed by tubes with stoppers for securing the grappling chains and movable escape pipes or radial tubes for the escape of the water, together with valves capable of being worked by chains or ropes and other appurtenances, as described.

Fourth, The combination of air vessels and chains or ropes, with windlasses or other lifting machinery, in manner described, for the purpose of grappling and raising sunken vessels or other submerged bodies, by such combined apparatus as described.

35,173.—C. E. Rankin, of New York City, for Album Case :

I claim, as a new article of manufacture, the described combination of the daguerreotype cases, A B, with the photographic leaves, D, and book cover, C, as and for the purpose shown and specified.

[This invention is a good improvement on the ordinary photographic album, and it consists in combining two ordinary daguerreotype cases with a book cover and a series of split leaves made to receive photographic or other portraits, in such a manner that an album case is obtained in which daguerreotypes or ambrotypes, as well as photographic pictures, can be preserved.]

35,174.—J. H. Redstone and A. E. Redstone, of Indianapolis, Ind., for Improvement in Valves for Steam Engines :

We claim, first, The hollow valve, A, when constructed as set forth and operated in connection with the steam passages, H I, and K L.

Second, The valves, F and G, when constructed and operated as set forth.

35,175.—E. B. Requa, of Jersey City, N. J., for Improved Lamp :

I claim, first, The combination of the two tubes, G J, one placed within the other, and the inner one inclosing the wick tube, E, when said tubes are provided respectively with cones or deflectors, H I, so constructed as to admit of a space, e, between them, having a narrow passage, e', to increase the rapidity of the draught and cause a quick current of air to impinge against the sides of the flame, j, substantially as and for the purpose set forth.

Second, Providing the lower end of the wick tube, E, with a cap, F, to serve as a top for the fountain, A, when said cap is used in connection with the tube, G, applied to the burner, D, the latter screwed into the jacket or case, B, and all arranged, as shown, to form a simple device to admit of the flame being supplied with a requisite quantity of air at its base, and by a current which passes around the fountain, A, to keep its contents cool, as described.

Third, Insulating the cones, H I, from their respective tubes, G J, by means of plaster of Paris, or other good non-conducting cement, for the purpose of preventing the heat being conducted down to the burner and fountain, as set forth.

Fourth, The combination of the two tubes, G J, cones, H I, wick tube, E, cap, F, burner, D, flanch, g, jacket or case, B, and fountain, A, all arranged as and for the purpose specified.

[This invention relates to an improved lamp of that class designed for burning coal oils without a chimney, and consists in constructing the burner of the lamp in such a manner that the flame will be supplied with a requisite amount of oxygen to insure perfect combustion and at the same time be capable of being adapted or applied to any of the lamps in general use, without heating and vaporizing the oil in the lamp to cause an explosion thereof, and without obstructing the rays of light or casting a shade around the lamp.]

35,176.—A. K. Rider, of Hydeville, Vt., for Improved Cut-off Valve :

I claim, first, The cut-off valve, G, having its end or ends oblique to the direction of the movement of the main valve and applied to the latter valve in combination with a stem, f, or its equivalent, by which it is moved transversely to the main valve, and operating substantially as described, in combination with an oblique arrangement of the outer orifices of the main valve ports for the purpose set forth.

Second, Combining the stem, f, of the so constructed and applied cut-off valve, with a governor, by means of a handle or hand lever, l, dog, m, a sector plate, p, and an arm, q, substantially as and for the purpose described.

35,177.—E. Y. Robbins, of Cincinnati, Ohio, for Improvement in Ventilation :

First, I claim the arrangement of the hot-air chamber, or reservoir of heat, for warming the floor and lower part of the rolls, in connection with the arrangement for the introduction at the bottom of the room of moderately-warmed fresh air which has not been in contact with the hot metallic surface either of hot water pipes or steam pipes or of a stove or furnace or any other highly-heated surface, substantially as set forth.

Second, I claim the use of the lower and outer boundary of the hot-air chamber as a large non-metallic warming surface for the purpose of warming, to a moderate degree, the fresh air before it enters the room, substantially as set forth.

Third, In case of warming the upper rooms by the waste heat of the fire in the lower story, I claim the arrangement of an inner smoke flue within the brick flue or chimney, E, Fig. 3, and the diaphragm, Fig. 5, for turning the current of hot air rising between this inner smoke flue of the sides of the chimney inward under the floor of the upper room, or equivalent device between.

Fourth, In using hot-air pipes for warming cars or rooms, I claim the making of said pipes in their different parts of different materials and of different shapes, so that their conducting and radiating power shall increase as the distance from the furnace or source of heat increases, and as the temperature of the air within them decreases ; so that they shall distribute the heat as nearly uniformly as possible throughout their entire length, substantially as set forth.

35,178.—H. E. Robbins, of Hartford, Conn., for Improvement in Tobacco Cases :

I claim, as a new article of manufacture, a pocket tobacco box, constructed substantially in the manner as and for the purpose as described.

35,179.—Watson Sanford, of Brooklyn, N. Y., for Improvement in Dampers :

I claim the valve or register, C, when combined with the pipe collar and its flange, and applied to a stove or heater for the purposes and substantially in the manner described.

35,180.—Watson Sanford, of Brooklyn, N.Y., for Improvement in Hot-air Furnaces :

I claim, first, casting the fire pot and dome or the section between the red lines, 1 1 and 2 2, or any greater section, either above the line, 1 1, or below the line, 2 2, together with the first section of smoke flues or pipes all in one piece, substantially as and for the purposes described.

Second, Forming the fire pot as well as the lower section of the dome with corrugations which shall be continuations of each other, the interior concave parts of which form the exits for the smoke or the commencement of the smoke flues, as and for the purposes set forth.

Third, Providing the furnace or heater with an enlarged dome, b, in combination with the extension of the corrugations or smoke flues, D, by means of the corrugations, f, or their equivalents down to or below the surface of the fuel charge, substantially as set forth.

Fourth, In combination with the enlarged dome and corrugations or smoke flues so located, that is, extending down to or below the surface of the fuel charge, the distribution of the smoke exits all around the body of the fire pot and near together so as to make regular corrugations for the purposes and substantially as indicated.

35,181.—Watson Sanford, of Brooklyn, N. Y., for Improvement in Stove Linings :

I claim, first, The pins, b, as and for the purpose specified.

Second, The combination of the pins, b, with the corrugations, a, or cells or panels, c d e, substantially as and for the purpose set forth.

Third, The combination of the pins, b, and corrugations, a, with the ribs, h, in the manner and for the purpose indicated.

Fourth, When my invention is used as a guard plate or lining, I claim the exterior concave portions, f, or channels, g, for the purpose of admitting air between the said guard plate or lining and the shell of the stove or furnace, as set forth.

35,182.—John Shaefer, of Lancaster, Pa., for Improved Attachment for Bedstead Rails :

I claim the diagonal combination of the bevel-slotted plate, A, with the bevel-hooked plate, B, the whole being constructed and arranged and attached in the manner and for the purpose specified, substantially as set forth.

35,183.—D. C. Smith and W. P. Walling, of Adrian, Mich., for Improvement in Water Elevators and Conveyers :

We claim the combination with carriage, K, of the plate, M, arranged to work in joint operation with spring, T, pawl, 12, incline planes, X X, clamps, V V, and lug, 18, for the purpose set forth.

Second, We also claim, in combination with the foregoing the bail, 2, rod, 3, and cover, 4, connected together as described and for the purpose specified.

35,184.—H. J. Smith and Woodruff Jones, of Philadelphia, Pa., for Improvement in Apparatus for Testing Coal Oils and other Mixed Liquids :

We claim determining the amount of volatile inflammable matter in compound liquids by means of a thermometer and a flame, the thermometer being applied to the liquid while the heat is imparted to the latter and the vapor generated by the heat being directed to the flame substantially as set forth.

35,185.—J. P. Smith, of Hummelstown, Pa., for Improvement in Corn Shellers :

I claim the shifting breast beam, n, arranged and operating in combination with the shelling cylinder, d, substantially as and for the purpose specified.

I also claim the combination of the shelling bar, j, with the shelling cylinder, d, and shifting breast beam, n, substantially as set forth.

35,186.—O. W. Stearns, of Johnson, Vt., for Improvement in Wooden Tubing :

I claim the tube formed by the combination and arrangement of the parts, A A, ferrule, B, strainer, C, matching pieces, D D, channel, E, and wire, F F, or its equivalent, substantially as described.

35,187.—R. Van Ormer and W. J. Bell, of McAllisterville, Pa., for Improvement in Balancing Mill Stones :

We claim the combination of the rods, R R', spring, S, and screw, S', in the manner and for the purpose shown and described.

35,188.—W. H. White, of Woodbury. Conn., for Improvement in Sheep Shears :

I claim the described article called a sheep shears made substantially in the manner described, and consisting of a steel bow, iron handles and cutting edges, arranged and attached to each other substantially in the manner set forth.

35,189.—J. P. Walter, of Brooklyn, N. Y., for Improvement in Vacuum Tanks :

I claim, first, The arrangement of one or more air pumps, B, in combination with the wheels, D D', eccentries, j, and working beams, i, or their equivalents, and with the tank, A, constructed and operating substantially in the manner and for the purpose shown and described.

Second, The arrangement of one or more reservoirs, E, containing suitable chemicals in combination with the air pumps, B, and tank, A, substantially as and for the purpose set forth.

35,190.—Chas. Wadsworth, of New York City, for Improvement in Car Ventilators :

I claim the combination of the air filtering screen, I, and air chamber, d, with the air-forcing bellows, substantially as and for the purpose shown and described.

[This invention consists in forcing or injecting into a railroad car pure air through the medium of one or more bellows and suitable pipes or pipes.]

35,191.—J. B. Winchell, of Chicago, Ill., for Improvement in Sewing Machines :

I claim, first, A sewing machine organization which will interlock two threads and sew continuously in the same direction without changing the direction of feed or the character of sewing, with a single pointed hook or interlocking device, substantially as described, whether the connecting mechanism intermediate between the upper needle and the hook or interlocking device is set in motion by either a back or forward revolution of the main shaft, substantially as set forth.

Second, The combination of the specified lower spool case and the specified disks between which it is arranged, and all the remaining specified operative parts of mechanism, substantially as and for the purposes set forth.

Third, The combination of the angular slotted extension of the needle arm, slotted connecting rod, R, main shaft, Q, rod, T, segment arm, O', and pinion, N, or their equivalents, substantially as and for the purposes set forth.

35,192.—G. L. Witsil, of Philadelphia, Pa., for Improved Nutmeg Grater :

I claim a nutmeg grater consisting of the case, A, chamber, A', and cylinder, B, arranged and combined together, substantially in the manner described and set forth.

35,193.—J. P. Woodbury, of West Roxbury, Mass., for Improvement in Arming War Vessels :

I claim, first The employment of a gun or guns constructed and operating substantially as described, in a ship so constructed and defended with armor plates or their equivalent that the ship may approach an enemy with reasonable safety, substantially in the manner and for the purpose described.

Second, Combining a gun, constructed and employed in a vessel as described, with an appropriate gun carriage to support the breech ; a socket and stuffing box in the side of the hull to support the muzzle, and an external port or shutter, or other devices equivalent thereto, to enable the gun to be worked substantially as described.

Third, Displacing the water from the bore of the gun between the charge and muzzle by means of air-tight displacing case, or its equivalent, substantially as described.

35,194.—A. E. Young, of Dorchester, Mass., for Reflecting Lantern :

I claim a glass lantern body as constructed, with a lateral neck and opening or socket, arranged relatively to its top and bottom necks and openings and for the reception and fixation of a reflector, substantially as specified.

35,195.—Erastus Young, of Penataquit, N. Y., for Improved Washing Machine :

I claim the arrangement of the adjustable fulcrum pin, f, in combination with the hand lever, C, toggle arms, D, pressure board, B, and suds box, A, all constructed and operating as and for the purpose set forth.

[This invention consists in the arrangement of a hand lever with an adjustable fulcrum in combination with toggle arms and with an oscillating pressure board, in such a manner that by changing the position of the fulcrum of the hand lever the pressure board can be adjusted for clothes of different size and of different fabric, and that the clothes can then be subjected to any desirable pressure and the washing effected without much exertion of the operator and without the least injury to the fabric.]

35,196.—C. F. Allen (assignor to himself and C. B. P[illegible]e and H. Taylor), of Paw Paw, Mich., for Improvement in Car Bumper and Draw-head Springs :

I claim a car, bumper or draw-head spring, constructed substantially in the manner and for the purpose set forth.

35,197.—Victor Baron, of Tabanco, St. Salvador, assignor to himself and W. W. W. Wood, of Philadelphia, Pa., for Improvement in Concentrating and Cleaning Ores :

I claim concentrating and cleansing ground or pulverized ore by causing it to pass along an agitated channel submerged in water, substantially as set forth.

35,198.—Hiram Carpenter (assignor to H. V. Gahagan), of New York City, for Improvement in Construction of Railways :

I claim the combination of the pedestals with wrought-iron crossties and chairs, or their equivalents, and either with or without the addition of any elastic material, substantially in the manner described and for the purpose specified.

35,199.—H. B. Gill (assignor to Erastus Tarbox), of Ogden, N. Y., for Improvement in Machine for Packing Apples :

I claim the combination of the spring hook clamps, B B, with the cross heads, A, screw, D, and follower, E, substantially as and for the purposes specified.

35,200.—C. D. Ingraham (assignor to himself and C. A. and A. Bardwell), of South Falls, Mass., for Improvement in Straw and Hay Cutters :

I claim a cylinder of knives formed by having the knives arranged in sets or pairs which are shorter than the cylinder, and attached thereto in such a manner that the knives of one set or pair will be out of line with, or in different planes from those of the other set or pair, and used in connection with a cylinder, E, or its equivalent, substantially as and for the purpose set forth.

[This invention relates to that class of straw and hay cutters in which a cylinder of knives is employed in connection with a rotating cylinder to form a bearing for the cutting edges of the knives. The object of the invention is to obtain a machine of this class which will work or operate with the usual rapidity and cut the hay or straw much longer than those hitherto constructed, and still be self-feeding.]

35,201.—Josiah Mason, of Birmingham, England, assignor to E. C. and J. H. Pratt, of Philadelphia, Pa., for Improvement in Boxes, Cases and Cards for Pens, &c. :

I claim a box, case or card having a recess or recesses either permanent or formed by elastic surfaces, and having suitable fastenings for receiving and holding a sample or samples of the articles contained in the box or in the case of a card, for holding the articles themselves, as set forth for the purpose specified.

35,202.—Joseph Moore (assignor to the Vulcan Iron Works Co.), of St. Francisco, Cal., for Improvement in Ore Crushing Mills :

I claim, first, The combination of the stampers, F, grating, H, elevators, V, and screen, Y, arranged for joint operation as and for the purpose set forth.

Second, The construction of the frame of the machine, to wit, the rods, I, braced by the cross rods, J, the shrouding, M, attached to rods, I, to form the mortar box, and the guides, L L, fitted on said rods, I, as set forth.

35,203.—I. S. Schuyler (assignor to J. J. Eckel), of New York City, for Improvement in Baling Press :

I claim the two rack bars, B' B', attached to the plunger or follower, B, in combination with the gearings, a a E E F F, shaft, C, all arranged and applied to the box, A, to operate as and for the purpose set forth.

I also claim the fast and loose ratchet collars, e g, placed on the shaft, C, and the collars, g, arranged with springs, i, and levers, G, substantially as shown, when said collars are used in connection with the gearing and rack bars described, as and for the purposes specified.

35,204.—E. W. Seymour, of Lisle, N. Y., for Improvement in Method of Constructing Carriages :

I claim the peculiar construction and combination of springs running lengthwise, and attached behind to the axle, when connected with relieving bars behind, and both acting as relieving bars in front and operating in conjunction with each other, and from the center each way, forming a reach and saving the springs from the tension of the draft.

DESIGNS.

1,572.—J. W. Bush, of New York City, for Design for Anklet.

1,573.—G. B. Owen, of New York City, for Design for a Clock Case.

1,574.—W. G. Phelps, of Newport, Del., for Design for an Arm Chair.

1,575.—Henry Terhune, of New York City, for Design for a Clock Case.

New Publications.

THE EXCHANGE. Published monthly by Sampson, Low, Son & Co., No. 47 Ludgate Hill, London, and Walter Low, No. 39 Walker street and No. 823 Broadway, New York City.

This is the initial number of what promises to be a well-conducted and useful periodical, moving in a path apart from publications devoted to a lighter literature, being a comprehensive review of commerce, manufactures and general politics. The articles in the present issue most likely to interest the American reader are on "Mexico and the Intervention," "The American Conflict," "The Resources of Canada," and "Cotton." These are all well and sensibly written. The rest apply to topics more peculiarly British, but to the general commercial reader are likewise valuable.

THE INDIAN SCOUT ; or, Life on the Prairie. By Gustave Aimard. Published by T. B. Peterson & Bros., Philadelphia. Sold by F. A. Brady, No. 24 Ann street, New York City. Price 50 cents, postage free.

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PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address

MUNN & CO.,
No. 37 Park-row, New York.

PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN ; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the inventio The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principle office, No. 37 Park-row, New York, or either of our Branch Offices.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

I. C. of N. Y., and S. J. B., of N. J.—A deed of transfer of a patent should be put on record within three months after its date. The purchaser should pay the recording fee unless there is an agreement to the contrary.

T. T., of N. Y.—We think you are on the right track. Submarine vessels must yet occupy an important place in the destruction of naval vessels. The subject is worthy of much attention, and other parties are at work trying to devise some effective vessels of this character.

A Miller, of Ohio.—Your reply to "A Young Miller, is received, but as the same ground has been taken before you, we do not publish it. We have already published enough on the subject.

C. B., of Conn.—We are impressed favorably with your projectile, and should think a patent might be obtained for it.

M. F., of Ill.—Your shell filled with chloroform and cayenne pepper would be a very harmless affair.

W. H. S., of Mass.—There are projectiles in the service formed on your plan of cast iron with a steel face.

J. C. A., of Mass.—We have bushels of communications, and when one is examined and passed upon, it goes to the paper makers, and we can see it no more. A patent could probably be obtained for your composition.

C. E. W. S., of Wis.—It takes one-horse power to raise 33,000 lbs. one foot high per minute. A cubic foot of water weighs 62½ lbs., and the area of the cross section of a pipe 6-inches in diameter is 28,274 inches. We should want to know the velocity of your stream in order to answer your question ; but from the above data you can make the calculation by the simple rules of arithmetic.

A. J. S., of Pa.—Magnetic electric machines produce a current of electricity which, passing through a helical wire, induces magnetism in a piece of soft iron in the core. No acid or other liquid is used, but power is required to turn the machine. See illustration of Beardslee's magneto-electric machine on page 353, Vol. V. SCIENTIFIC AMERICAN, or address G. W. Schramm, No. 44 Cliff street, this city in relation to it.

C. M. B., of Me.—The substance that you send us is kaolin, and if you have a large bed of it of a quality equal to this sample it is valuable.

J. B., of Wis.—The idea of exhausting the air from the bore of a gun is a very old one and not patentable.

H. D. B., of N. Y.—The operating of a melodeon bellows by means of a weight instead of by the foot would not be patentable ; neither would the use of a spring, from the fact that both plans are in use in other analogous pieces of mechanism.

E. H., of Mass.—Your thermometer appears to be new and useful, and we think a patent can be obtained on it. A model is necessary, and when you send it state as nearly as possible the proportion between the heat of the air in the air chamber and the actual heat of the metal.

L. W., of N. Y.—You will find the Fourneyron and Jonval wheel described on page 212 present Vol. SCIENTIFIC AMERICAN. The Fourneyron wheel, does not discharge on the underside, like the Jonval.

C. S., of N. Y.—It would require a considerable amount of power to wind up a spring to churn a large quantity of milk, but a small churn, we think, may be continually operated by a spring. You can easily make the experiment without incurring much expense.

W. F. R., of R. I.—You state that in your opinion plaited wire of "sufficient thickness" would resist shot and shell. We have no doubt of it, but what do you require as a "sufficient thickness" for this purpose?

J. C. C., of Ill.—A bullet shot vertically will return to the muzzle of the musket with the same force with which it left it minus the loss of force sustained by the resistance of the atmosphere. The spaces passed through by falling bodies are proportional to the squares of the times, 16 feet the first second, 64 feet the second, and so on. A feather and a piece of metal will fall with the same velocity in a vacuum.

T. A. McD., of Mich.—The manufacturers of "oreide.' an imitation of gold which does not readily tarnish, are Messrs. Holmes, Booth and Hayden, of Waterbury, Conn. They have a warehouse at No. 81 Chamber street, this city.

F. D. P., of Wis.—The largest importer of music boxes known to us is Marius J. Paillard, 21 Maiden Lane, this city. He has instruments which play from two to thirty-six tunes and the prices vary from $2 to $1,000 according to the number of tunes, and quality of the instrument.

H. M. D., of Ohio.—A series of paddles secured on an endless chain and passing over two groved pulleys on the side of a steamboat, is an old mode of propulsion. You will find this system illustrated on page 152, Vol. V. (old series) SCIENTIFIC AMERICAN. You will also find Rumsey's mode of propelling, by ejecting a current of water from the stern of a boat illustrated on page 112 same volume.

B. & Co., of Mass.—Iron may be coated with copper by first covering it with a skin of tin. After being tinned, the iron diped into a bath of molten copper, the surface of which should be covered with a layer of ground glass or sand.

L. P. B., of Ind.—A very dark blue may be dyed on wool with one ounce of the prussiate of potash, half an ounce of the sulphate of iron, one gill of the muriate of tin, and the extract of two pounds of chip logwood to 5 lbs. of wool. Boil all together for three-quarters of an hour.]

J. P. J., of Wis.—We have given our reasons in former volumes of the SCIENTIFIC AMERICAN, why hot-air engines are not adapted for locomotives and large motors. Small air engines are very convenient for some purposes.

SPECIAL NOTICE—FOREIGN PATENT.—The population of Great Britain, is 30,000,000; of France, 35,000,000 ; Belgium, 5,000,000, Austria, 40,000,000; Prussia, 20,000,000; and Russia, 60,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. Nearly all of the patents secured in foreign countries by Americans are obtained through our agency. Address Munn & Co., 37 Park row, New York. Circulars about foreign patents furnished free.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, May 14, 1862 :—

P. C. T., of N. Y., $10; F. B. P., of N. Y., $20; A. McG., of N. Y., $20; O. H., of N. Y., $22; P. L. K., of Ill., $20; M. and S. S., of O., $20; L. A. S., of N. Y., $20; H. C. R., of Pa., $50; C. F. W., of Pa., $15; I. B. J., of O., $15; J. C. P., of N. J., $40; N. and J., of Pa, $15; A. and S., of Pa., $15; G. P., of Iowa, $25; G. E. H., of N. Y., $15; J. H. K., of Pa., $25; H. W., of N. J., $10; J. B. Z., of N. J., $25; S. P. R., of Mass., $25; J. L. S., of N. Y., $25; J. B., of Ind., $25; A. B., of N. Y., $20; F. W. A., of N. Y., $55; J. C., of N. Y., $20; E. R. McC., of Iowa, $20; C. J., of N. Y., $20; E. C., of Ky., $40; H. B., of Wis., $25; H. C. J., of Me., $15; A. B. C., of Mich., $25; M. R. S., of N. Y., $45; A. C. F., of Iowa, $25; H. M., of Mass., $10; G. B. O., of N. Y., $15; C. and C., of O., $10; S. M., of Del., $15; W. W. M., of Me., $15; J. M. D., of N. Y., $25; G. M. T., of N. Y., $25; E. M., of Conn., $25; L. H., of Hungary, $43; B. T., of Ill., $45; T. B. B., of N. Y., $22; G. H., of N. Y., $20; H. W. S., of England, $40; W. C., of O., $20; S. T. W. P., of N. Y., $25; C. O. G., of Mich., $25; A. and M., of Wis., $352; G. P. B., of Pa., $15; E. S., of Mich., $30; J. K. B., of Ill., $15; W. B. B., of Conn., $45; T. and R., of Ind., $20; J. N. B., of Iowa, $25; P. D., of Mich., $50; W. and F. K., of N. J., $25.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from May 7 to Wednesday, May 14, 1862 :—

O. H., of N. Y.; T. B. B., of Iowa; A. C. F., of Iowa; J. M. D., of N. Y.; G. M. T., of N. Y.; A. and M., of Wis.; H. B., of Wis.; J. L. S., of N. Y.; F. and J., of England; T. B. B., of N. Y.; J. N. B., of Iowa; C. O. G., of Mich.; W. H. McN., of N. Y.; P. K., of Conn.; J. B., of Ind.; H. C. R., of Pa., (2 cases); W. and F. K., of N. J.; H. D. L., of France; J. C. P., of N. J.; J. H. K., of Pa.; S. P. R., of Mass.; A. B. C., of Iowa; M. F., of Conn.; S. T. W. P., of N. Y.; S. G. McM., N. Y.

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UNION MASTIC ROOFING COMPANY, LOCATED at Poughkeepsie, N. Y.—We manufacture and ship to all parts of the world this celebrated roofing, with full printed directions for applying it. Any body can put it on. It is cheap, it is fire and water proof, it is adapted to steep and flat roofs, and it will satisfy any body that looks at it as to durability. For further particulars send for circulars and samples. Agents wanted in all parts of the world, to whom good inducements are offered. C. C. HOFF, General Supt.
21 4

PICKERS.—RICHARD KITSON, HEAD OF WORTHEN street, Lowell, Mass.—Manufacturer of Kitson's Patent Cotton Mixer, Kitson's Patent Cotton Opener, Kitson's Patent Cotton Picker, Kitson's Patent Cotton Waste Machine and Rag Picker; also Build's English Scutchers (pickers), of the following celebrated patterns:—Walker & Hacking, Lorg & Brothers, Taylor, Lang & Co., Manufactures Needle-Pointed Card Clothing, for Carding Hemp, Jute, Flax, &c. Parties in want of second-hand pickers can be informed where to procure them. 21 13

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MILL STONE DRESSING DIAMONDS, SET IN PATent Protector and Guide. For sale by JOHN DICKINSON, patentee and sole manufacturer, No. 64 Nassau street, New York City. Also manufacturer of Glazier's Diamonds. Old Diamonds re-set.
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TO THE HARDWARE TRADE.—THE HARDWARE News. $2 per annum. Published by JOHN HILLYER, No. 9 Pearl street, New York City. 1*

THE PATENT SOLAR MATCHES CONTAIN NO SULphur, and are the best burning match yet invented. They are as cheap as sulphur matches, without their offensive smell when burning. For licenses to manufacture, address the SOLAR MATCH COMPANY, Nos. 101 and 103 Beekman street, New York City. 20 4*

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20 tf. DAVID LYMAN, Treas.

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METALS.—THOS. J. POPE, NO. 92 JOHN STREET, New York City.—Charcoal and Anthracite Pig Iron, direct from furnaces, Bar Irons, to order, from mills, Ingot, Copper, Lake, Baltimore, &c., Old Copper, Lead, Tin, Antimony, Cut Nails, Babbit Metal.
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SPRING TACKLE BLOCKS.—PATENT RIGHT FOR Sale, or license to manufacture granted on reasonable terms. See invention described in SCIENTIFIC AMERICAN for May 10, 1862. Address Mrs. EUNICE B. HUSSEY, Baltimore, Md. 19 7*

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ANILINE COLORS.—FUCHSINE, BLUE DE LYON and VIOLET IMPERIAL, of the products of Messrs. RENARD, FRERES & FRANC, Lyons, France Secured by Letters Patent of the United States, granted July 31, 1860, and July 30, 1861. The undersigned are prepared to offer for sale, or to receive orders for the above products. A. PERSON & HARRIMAN, Nos. 60 and 62 Murray street, New York City. Sole agents for the United States. 17 12*

A SUBSTITUTE FOR LEAD PIPE, VIZ., A SEMIElastic Pipe or Hose. C. McBurney's Patent.—It can be universally applied for the forcing, suction or conducting of water, hot or cold, in any and every place. It imparts no deleterious substance to water under any circumstances. It is sufficiently elastic to be easily bent into curves, &c. It is not affected by heat or cold. It will not burst if water is frozen in it. Is not injured by exposure to the atmosphere or sun, and it has been thoroughly tested for seven years. In short, the pipe is composed of ingredients indestructible except by fire. Manufactured by the BOSTON BELTING, PACKING & HOSE CO., Boston, Mass. Price list and circulars sent to order. TAPPAN, McBURNEY & CO., Agents, Boston, Mass. 15 3m

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LARGE MANUFACTORY AND STEAM POWER FOR Sale or to Let Cheap.—For sale or to let, in Bridgeport, Conn., a Large Frame Manufactory, 133 feet long, 33 feet wide and four stories high; was built a few years since for a carriage manufactory, but is now supplied with a 40 horse power engine and boiler in complete order, with shafting and steam-heating pipes throughout. It is centrally and pleasantly located, and well calculated for light manufactures. Numerous parties in Bridgeport would like to hire power. The whole will be sold or let on reasonable terms. Also for sale or to let a large manufactory in Westport, Conn., built of brick, with an engine of 200-horse power. Apply to P. T. BARNUM, American Museum, New York City, or Bridgeport, Conn. 12 tf

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SOLID EMERY VULCANITE.—WE ARE NOW MANUfacturing wheels of this remarkable substance for cutting, grinding and polishing metals, that will outwear hundreds of the kind commonly used, and will do a much greater amount of work in the same time, and more efficiently. All interested can see them in operation at our warehouse, or circulars describing them will be furnished by mail.
NEW YORK BELTING AND PACKING CO.,
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MANUFACTURERS OF
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These wheels are consolidated upon an entirely new and scientific principle. Composed of pure Turkish Emery, free from glue, rubber, vulcanite, and all other glutinous substances; they are the only legitimate Emery Wheel ever introduced into the market.

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MORGAN IRON WORKS, NEW YORK, Nov. 20, 1861.

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Improved Ventilator for Houses.

The annexed engravings represent a device for ventilating houses, which, from its simplicity, is very little liable to become disarranged, while it is operated with great facility.

Fig. 1, shows the ventilator turned down in a horizontal position, Fig. 2, is a back view in its normal position, and Fig. 3, is a perspective. A circular opening is cut through the wall, and is covered by the wheel, B, which is fixed rigidly in place. The central portion of this wheel is crossed by radial arms, and half of the segments between these arms

Fig. 1

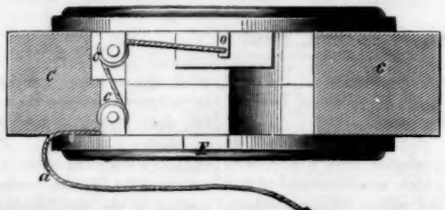


Fig. 3

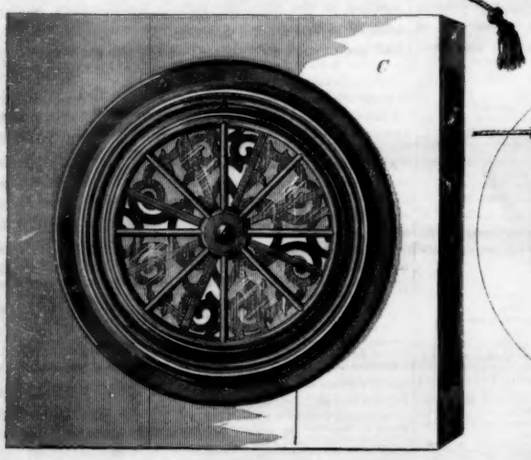
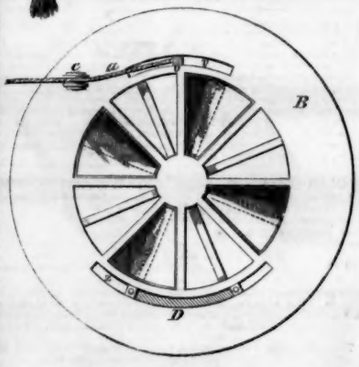


Fig. 2



WILLIAMS'S VENTILATOR FOR HOUSES.

are filled with plates of window glass; each alternate segment being glazed and the others left open.

Through the axis of the wheel, B, a spindle is passed, and upon the outer end of this spindle a second wheel, A, is hung in immediate contact with the wheel, B. This outer wheel has its alternate segments glazed in the same manner as its fellow, and it will be seen that when the wheel, B, is turned so that its open segments are opposite the open segments in the wheel, A, the air may pass freely through both wheels, but when it is so turned that its glazed segments are opposite the open segments of the wheel, A, then no air can pass.

The wheel, B, is usually kept in position to close the ventilator by a weight, D, fastened upon one side, and swinging in a recess or slot made for the purpose in wheel, A.

To facilitate the opening of the ventilator, a cord, *a*, is attached to a projection, *o*, on the wheel, B, and passed around pulleys, *c c*, into the room. By pulling this cord, the wheel, B, is turned upon its axis; and a stop is provided to arrest the turning at such point as will cause the open segments of the two wheels exactly to coincide. The cord may be wound around a pin or otherwise secured to hold the ventilator open.

This ventilator works very freely and smoothly, and it is not likely to get out of order.

The patent for this invention was granted September 17, 1861, and further information in relation to it may be obtained by addressing the inventor, Samuel W. Williams, at Centreville, N. Y.

Amalgam Applications.

Mercury possesses the quality of uniting with a number of metals, forming a class of metallic compounds called amalgams, some of which are brittle, others soft. Under ordinary circumstances, iron and mercury do not unite, therefore the fluid metal is transported, and kept stored in iron flasks. An amalgam of tin is easily formed by triturating the two metals together in a suitable mortar, or by fusion at a gentle heat. This is the amalgam which is used for silvering looking glasses. Lead and mercury unite readily in various proportions. An amalgam of 3 parts mercury, 1 of lead, and 1 of bismuth, is remarkable for its fluidity, and it may be squeezed through leather without separation of the elements. It is employed for silvering the interior of hollow glass spheres, previously made clean and warm. All amalgams may be decomposed at a moderate heat. Advantage is taken of this property in what is called water gilding, or gilding metallic articles, such as brass buttons. A small portion of gold is dissolved in a large quantity of mercury, the brass articles to be gilt, being made perfectly clean, are anointed with the amalgam, and then placed in a furnace and heated. The heat drives off the mercury, leaving the gold adhering to the brass in a thin, frosty film. The luster is developed by burnishing. Brass articles may be silvered in the same manner. Cast iron, wrought iron, steel, copper or brass may be tinned with a soft amalgam of tin and mercury. The articles are scoured bright with acid, sand or emery. No oxide, or grease must be on the surface of the article to be tinned. The amalgam is then rubbed on with a piece of coarse cotton cloth, moistened with dilute hydrochloric (muriatic) acid. All the parts of the brass, or whatever other metal it may be, thus treated become thoroughly coated with the amalgam.

Iron may be coated with zinc by a peculiar amalgam process, patented several years since, in England, by Mr. Mallett. It was invented for the purpose of being applied to iron ships, to prevent their corrosion. The iron is first immersed in a cleansing bath, formed of equal parts sulphuric acid or hydrochloric acid and water, used warm. The metal is then hammered and scrubbed with emery and sand, to detach the scales of oxide, and to produce a thoroughly clean surface. The metal is next immersed in a preparing bath, consisting of a saturated solution of hydrochlorate of zinc and sulphate of ammonia; and, lastly, it is transferred to a metallic bath, composed of 202 parts mercury and 1,292 parts zinc, both by weight. To every tun weight of this alloy is added 1 lb. of potassium or of sodium, the latter being preferred. As soon as the cleaned iron has attained the point of fusion of this triple alloy, viz., 680°, it is removed, and is found to be thoroughly coated with zinc. The affinity of this alloy for iron is so intense that at the fusing heat of 680° it will dissolve a plate of wrought iron one-eighth of an inch thick in a few seconds. When the articles to be covered are small, or the parts minute, as for example, wire, nails or small chains, it is necessary before immersing them to permit the triple alloy to dissolve, or combine with some wrought iron, in order that its great affinity for the articles may be partially diminished.

A good amalgam for the use of the electrical machine is formed of 4 parts mercury, 2 parts zinc and 1 part tin. The zinc should be melted in an iron ladle, the tin added, and afterward the mercury, previously heated in another iron ladle, stirring the mixture with an iron rod. The amalgam should be poured, just before it solidifies, into a wooden or iron box, and be constantly agitated, by shaking until cold. It should then be triturated in an iron mortar, and sifted through a small muslin sieve, so as to obtain an extremely fine powder; this being rubbed up with a little lard, is to be spread on the rubber of the electrical machine with a pallet knife.

When a sheet of white paper is moistened with benzole it becomes temporarily transparent, and any lines may be traced through it. In a few hours the benzole evaporates, and the paper becomes opaque, as before.

FROM THE STEAM PRESS OF JOHN A. GRAY.